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PART

1

FINAL ENVIRONMENTAL IMPACT STATEMENT

METROPOLITAN WASHINGTON REGIONAL RAPID RAIL TRANSIT SYSTEM

PROJECT DC-23-9001

U. S. DEPARTMENT OF TRANSPORTATION

URBAN MASS TRANSPORTATION ADMINISTRATION

IN COOPERATION WITH THE

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

AUGUST 1975

THE U.S. DEPARTMENT OF TRANSPORTATION

URBAN MASS TRANSPORTATION ADMINISTRATION

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WASHINGTON METROPOLITAN AREA
TRANSIT AUTHORITY

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE REGIONAL SYSTEM

PART I DESCRIPTION OF THE PROPOSED ACTION AND ITS PURPOSES

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August 1975

PREFACE

This system-wide Final Environmental Impact Statement (EIS) represents documentation of the environmental impacts which are expected to result from construction of the regional rapid rail transit system for the metropolitan area of Washington, D.C.

This statement is based upon an environmental impact assessment prepared by the Washington Metropolitan Area Transit Authority (WMATA) and its consultant, Wallace, McHarg, Roberts and Todd. The WMATA environmental assessment addressed issues raised in community information meetings and at public hearings held to consider possible significant environmental impacts of constructing the regional system. Responses to issues raised at these meetings and hearings were incorporated into the assessment.

In 1973, WMATA, in cooperation with the Department of Transportation, prepared a Draft EIS based upon its earlier environmental assessment. The Draft EIS was circulated in February of that year to federal, state, and local agencies and was made available to interested groups and individuals. The Urban Mass Transportation Administration (UMTA) in cooperation with WMATA has now prepared and is circulating the Final EIS because of a request by the Government of the District of Columbia (District) that certain designated urban Interstate Highway segments be withdrawn in order to fund a substitute transit (Metrorail) project.

The Federal Aid Highway Act of 1973 specifies that such substitute projects are subject to the legal and administrative requirements of the UMTA capital assistance program, including environmental requirements. The Final EIS has therefore been prepared on the basis of the Draft EIS and comments received in response to its circulation to reviewing agencies and private groups and individuals. In this regard, all comments received have been addressed in the Final EIS in accordance with the guidelines of the Council on Environmental Quality.

Up to the present, Federal funding of the Metrorail system has been through direct Congressional appropriations and has not been subject to many of the legal and administrative requirements of the UMTA capital assistance program. However, as earlier mentioned, with the withdrawal of Interstate Highway segments and the request for funding of individual sections of the Metrorail system in their lieu, these requirements become applicable to sections of the system for which UMTA funding is contemplated. A joint final application for the substitute transit projects is expected to be submitted by the District and WMATA in the near future. The Final EIS will be available to interested parties for 30 days prior to a decision on the grant request.

The scope of the UMTA project consists of work to be accomplished under 35 section contracts for which final engineering and design is complete or rapidly nearing completion. All these sections are included in the Adopted Regional System and have been sequenced to conform with WMATA's adopted Design and Construction Schedule for the regional system. A list of the sections which comprise the UMTA project scope follows: (see next page)

The preceeding list of project sections comprises the set of construction, procurement, and installation contracts which WMATA would have awarded next under the sequence established in its design and construction schedule. This sequencing of contract awards was developed to enable completion of the system incrementally, in continuous operational phases. The project will result in completion of Phase III and advancement of subsequent phases of the system in accordance with the Authority's critical path schedule. Deviation from this sequencing would tend to result in slippage of contract completion dates which are on the critical path of system implementation, with the likely result of increased costs through inflation.

In the list of UMTA project sections (pp. 3 and 4, above), those identified by an asterisk constitute the first funding phase. These were selected from the sequential list in turn -- as limited by the level of funding anticipated through the initial interstate Highway transfer -- except in those cases where changes were necessary to accommodate requirements unforeseen at the time the sequence list was established. The changes included in Phase I of the UMTA project are discussed below; some future unavoidable changes may occur.

> Section K-4b as presently designed assumes and is dependent upon construction of Interstate Highway I-66. At that time Phase I of the UMTA project was finalized by the District and WMATA, it was not known whether I-66 would be approved. This section was therefore deleted.
>
> Sections C-10a, C-10c, and J-1 cannot be awarded until negotiations for right-of-way have been completed.
>
> Section FF-1a must be moved ahead of the three preceding sections in order to construct access facilities for elderly and handicapped persons which are mandated by a recent court decision and therefore required before the Gallery Place Station can be opened to the public.

In addition to the section contracts specifically included in the scope of the UMTA project, some additional procurement and installation contracts may be added to the project by subsequent amendment in order to reduce the time until the sections which presently comprise the project are operational. Examples of this work include sub-station equipment, spare component assemblies, track, and fire protection equipment.

SUMMARY OF ESTIMATED TOTAL PROJECT COST
BY CONSTRUCTION SEGMENT

For a detailed narrative of the work to be accomplished under each section, refer to Attachment 1, page___.

CONTRACT NO.	SECTION NO.	COMMITMENT AMOUNT	SUBTOTAL (1)	GRAND TOTAL (2)
1A0062	*A-6b	$55,000	$58,836	$63,802
1G0011	*G-1	54,000	64,916	70,395
1G0021	*G-2	55,000	67,201	72,873
1A0131	*A-13	26,000	32,667	35,424
1G0031	*G-3	44,000	40,957	44,414
1L0011	*L-1	40,000	49,555	53,737
1F3012	*FF-1b	3,500	2,551	2,766
1K0043	K-4b	12,000	12,449	13,500
1Z0093	*GR-3	200	162	176
1Z4084	*TW-4	13,000	18,552	20,118
1C0101	C-10a	10,000	20,453	22,179
1C0103	C-10c	22,000	26,453	28,686
1J0011	J-1	5,000	14,239	15,441
1C0113	*C-11c	2,500	8,815	9,559
1Z4055	ESC-5	13,500	20,840	22,599
1C0112	C-11b	6,000	10,586	11,479
1E0011	E-1	33,000	64,094	69,504
1F3011	*FF-1a	3,500	4,337	4,703
1Z2024	COMM-4	2,000	3,214	3,485

(1) Includes Schedule Slippage, Modifications, Construction Insurance, Inspection, Real Estate, Utility Agreements, and Project Management.

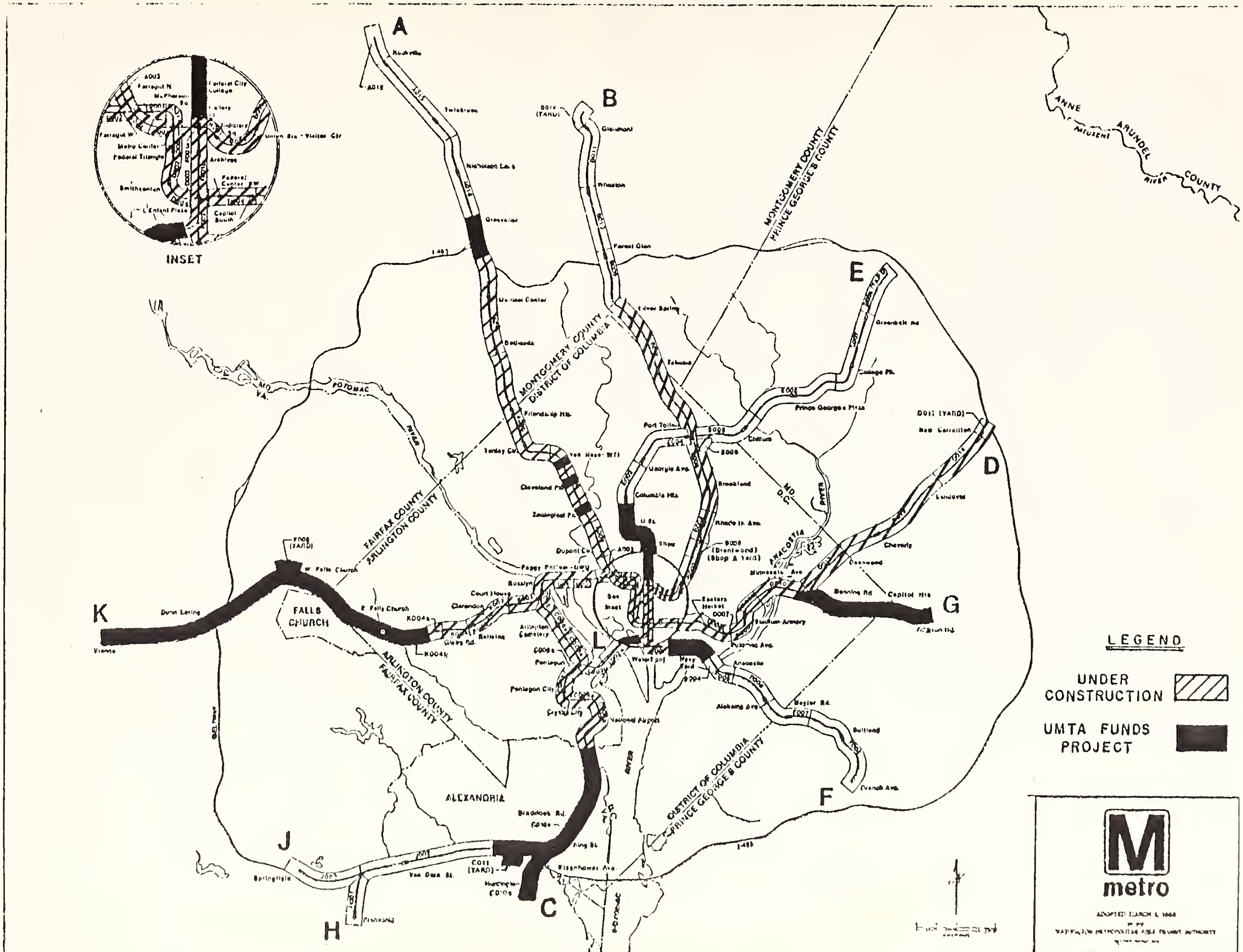
(2) Includes additional contingencies distributed through projects.

CONTRACT NO.	SECTION NO.	COMMITMENT AMOUNT	SUBTOTAL (1)	GRAND TOTAL (2)
1C0091	C-9	$29,000	$38,641	$41,902
1C0102	C-10b	60,000	80,842	87,665
1E0012	E-1b	26,000	55,807	60,517
1C0111	C-11	7,500	6,957	7,544
1F0031	F-3	67,000	80,268	87,043
1E0021	E-2	49,000	55,120	59,772
1K3021	FK-2	5,000	5,378	5,832
1Z4085	TW-5	25,000	35,829	38,853
1K0071	K-7	29,000	39,844	43,207
1K0081	K-8a	7,000	9,245	10,025
1K0082	K-8b	6,000	10,677	11,578
1K0061	K-6	10,000	22,242	24.119
1D3131	FD-13a	4,000	2,145	2,326
1D3132	FD-13b	4,000	1,813	1,966
1K3011	FK-1	4,600	4,801	5,206
1Z0094	GR-4	700	549	598
TOTALS		$734,000	$971,035	$1,052,993
	ADDITIONAL PROJECT CONTINGENCY		81,958	
	GRAND TOTAL OF PROGRAM		$1,052,993	

(1) Includes Schedule Slippage, Modifications, Construction Insurance, Inspection, Real Estate, Utility Agreements, and Project Management.

(2) Includes additional contingencies distributed through projects.

*Included in first phase program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INSET
MONTGOMERY COUNTY
PRINCE GEORGE'S COUNTY
DISTRICT OF COLUMBIA
FAIRFAX COUNTY
ARLINGTON COUNTY
ANNE ARUNDEL COUNTY
POTOMAC
RIVER
ANACOSTIA
FALLS CHURCH
ALEXANDRIA
LEGEND
UNDER CONSTRUCTION
UMTA FUNDS PROJECT
metro

One legal requirement which will be applicable to any portions of the regional system which are funded as part of the UMTA grant is Section 4(f) of the Department of Transportation Act of 1966, which requires that "the Secretary shall not approve any program or project which requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge or national, state, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, state, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife, and waterfowl refuge, or historic site resulting from such use."

Because funding by UMTA of the Metrorail system was not previously comtemplated, the provisions of section 4(f) were not generally applicable to work undertaken by WMATA prior to submission of this application. Under normal DOT procedure, all necessary documentation for section 4(f) approvals is developed concurrent with the final EIS. In the instant case, because the EIS covers at a general level the entire Metro system, including many projects which are not involved in section 4(f) requirements, the usual procedure would result in undue delay of availability of the final EIS and, therefore, of contract awards. In order to enable approval of the commitment of funds to certain of these ongoing projects, UMTA is distributing this final EIS with the understanding that all required section 4(f) approvals will be obtained prior to the approval of any given section which entails the use of section 4(f) lands.

It is anticipated that prior agreements between WMATA and the National Park Service, and between WMATA and the Advisory Council on Historic Preservation will provide documentation for any necessary section 4(f) analyses.

Based on information included in this Environmental Impact Statement (EIS) and comments received, the Administrator of UMTA in formally approving the project will make the following review and findings required by the respective sections of the Urban Mass Transportation Act of 1964 as amended:

Section 3(d) revised .... that the application -

(1) has afforded an adequate opportunity for public hearings pursuant to adequate prior notice, and has held such hearings unless no one with a significant economic, social, or environmental interest in the matter request a hearing;

(2) has considered the economic and social effects of the project and its impact on the environment; and

(3) has found that the project is consistent with official plans for the comprehensive development of the urban area.

Section 14(b) .... the project application includes a detailed statement on -

(1) the environmental impact of the proposed project,

(2) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(3) alternatives to the proposed project; and

(4) any irreversible and irretrievable impact on the environment which may be involved in the proposed project should it be implemented.

Section 14(c)..... that -

(1) adequate opportunity was afforded for the presentation of views by all parties with a significant economic, social, or environmental interest, and fair consideration has been given to the preservation and enhancement of the environment and to the interest of the community in which the project is located; and

(2) either no adverse environmental effect is likely to result from such project, or there exists no feasible and prudent alternatives to such effect and all reasonable steps have been taken to minimize such effect.

NOTE:

In order to facilitate comparison with the draft statement and to maintain consistency in page reference, the original pagination has been retained in Parts I and II of this Report. The Appendices in Part III are entirely new and are simply numbered sequentially, except for the original Appendices A and B.

Additional pages bear the number of the page they follow and are lettered sequentially; they bear the word "New" in the lower right margin.

Revised pages bear the word "Revised" in the lower right hand margin. A brief description of revisions on each revised page is set out with an asterisk on that page.

It should be noted that all portions of this report that are not marked "New" or "Revised" are in their original form from the 1973 draft statement, and contain some data that is updated by "New" and "Revised" pages.

*original preface replaced

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TABLE OF CONTENTS

*Route Summaries moved to Part II of Report; Agency Comments, Summary of Responses and Index to Location of Responses in Report, added.

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LIST OF ILLUSTRATIONS

SUMMARY SHEET

( ) (X) Final Environmental Impact Statement

by the U.S. Department of Transportation Urban Mass Transportation Administration in cooperation with the Washington Metropolitan Area Transit Authority.

1. Name of Action

(x) Administrative Action
( ) Legislative Action
(refer to correspondence between DOT and CEQ in Appendix A, Part III of this Statement, Appendices)

2. Brief Description of the Action

The Washington Metropolitan Area Transit Authority (WMATA) was created effective February 20, 1967, by Interstate Compact by and between Maryland, Virginia and the District of Columbia, pursuant to Public Law 89-744, approved November 6, 1966. The Authority's primary function is to plan, develop, finance and provide for the operation of a rapid rail transit system serving the Washington Metropolitan Area Transit Zone.

WMATA's Rapid Rail Transit System consists of 98.02 miles serving the District of Columbia, Montgomery and Prince George's Counties in Maryland, and Arlington and Fairfax Counties, and the cities of Alexandria, Falls Church and Fairfax in Virginia.

3. Summary of Environmental Impact and Adverse Environmental Effects

The major impacts of the Metro system are largely independent of specific locations of route alignments, deriving instead from the creation of the regional system. Impacts vary in character and magnitude locally, but regional impacts are assumed to be the major concern of this Summary. Major areas of potential local concern are summarized in Part II of this Study in detail in Route Environmental Studies available from WMATA.

Natural and Ecological Impacts

1. Metro has the potential of reducing the projected 49.6 million daily vehicle trips in 1980 to 48.0 million. This should have a positive impact on air, water and noise pollution.

Local concentrations of auto emissions could result at station locations. Short-term minor impacts such

*Lines 1-3 rev.;3. Intro. expanded; 3.1 1st para. rev. REVISED

as dust, noise and fumes could result from construction activities.

Vibration-induced noise and airborne noise from Metro operations will be limited by alignment locations and controlled by engineering measures designed to keep noise within existing ambient noise levels.

2. Approximately 18 million cubic yards of spoils will be generated. WMATA plans to use 60% as backfill. Spoils disposal is a potential problem at the disposal sites. State and local regulations govern location of disposal sites and control erosion and sedimentation. WMATA contracts cover the removal and hauling of spoils.

3. Erosion and sedimentation are potential problems related to excavation, extensive grading on slopes and construction in floodplains.

4. Metro will require some clear cutting of forest and other vegetation, physical alterations of stream channels and construction in floodplains. Hydrologic impacts due to these types of construction are expected to vary among sites.

5. Construction in predominantly open floodplains along some of the Metro routes will alter the natural floodplain environment. Although generally Metro development in floodplains will not be extensive, the development which is likely to occur in some areas adjacent to Metro alignments could, under present land use regulations over which WMATA has no control, have negative impacts on floodplain environments.

6. Some wildlife habitats in parklands and floodplains will be temporarily disrupted during Metro construction but most are expected to continue to function when construction is complete.

7. Some mature trees and vegetation will be lost along streets and parklands affected by Metro.

<u>Visual and Physical</u>

1. Physical impacts are primarily related to the cut-and-cover method being used in 21% of the system which results in short-term disruptions of streets and traffic and underpinning of some structures along alignments.

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2. Long-term visual impacts of Metro stations are expected to be positive. Metro facilities are being designed to complement rather than detract from their surroundings.

3. The use of subway in existing transportation rights-of-way insures that Metro will not impose new physical barriers within communities.

Social and Economic

1. Approximately 722 businesses and 951 households will be required to relocate for Metro construction. Relocation will proceed gradually over a ten-year period; therefore, no significant impact on the housing market is anticipated.[1]

2. Metro is expected to facilitate suburbanization by making outlying areas more accessible. Metro should have more of an impact on the distribution of population rather than actual growth. It is expected to promote more orderly growth.

3. While Metro will facilitate decentralization of employment, by serving residential communities with a large number of employees working in the District, Metro is expected to help the District maintain its economic viability. Employment centers along the routes will be able to draw from a larger employee pool with increased access due to Metro.

4. Handicapped persons will be able to use the system which has been designed with many special features for the handicapped.

5. Education facilities will become more accessible as will cultural and recreational facilities.

6. Metro is expected to stimulate development along its routes. WMATA is working with local jurisdictions who have the exclusive authority to regulate land use.

Parklands, Historical and Archaeological Sites

1. Approximately 80 acres of National Park Service parklands are potentially required for permanent Metro facilities.[2] Compensation will be made for any parkland taken. Additional small portions of parkland will be required in other jurisdictions. In most cases involving aerial structures, parkland may remain useable.

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[1]These estimates are subject to change at the time of general plan preparation.

[2]This figure includes 34 acres of permanent surface use, 11 acres of permanent aerial use, and 35 acres of permanent subsurface use.

2. Temporary construction activities in parklands will be more extensive and will require removal of vegetation. Some recreational facilities will be disrupted, but substitute recreational facilities will be provided prior to Metro construction. When construction is complete, WMATA will restore affected parklands in compliance with master agreements with the National Park Service and local governments. (See Part III of the study, Appendix B.)

3. Historical sites listed in the National Register affected by Metro include the Washington Mall, which will be temporarily disrupted by cut-and-cover construction and then restored, the old Adas Israel Temple, which was relocated, and the Arlington National Cemetery, which is near the site for a station. The Arlington Cemetery Station, However, will increase visitor accessibility and alleviate traffic congestion.

Other sites on the Register of local significance affected by Metro will include the Rockville B&O Railroad Station, which will require demolition or relocation; the east side of 700 block of 7th Street, N.W., which will require demolition or underpinning and reconstruction of the fronts; the 19th Street Baptist Church, which has been underpinned; the Woodward and Lothrop Main Building, which will require underpinning and will be connected to Metro Center Station by an underground passageway, and East Potomac Park.

Other historic sites of national and local significance in the vicinity of Metro alighments are not negatively impacted. Their accessibility is improved by proximity to a Metro Station.

4. Known archeological sites which may be disrupted by Metro construction include the Nacochtanke sites on the Anacostia River near the crossings of the New Carrollton and Branch Routes. Existing private and public facilities constructed near these two sites already have disrupted the area.

4. <u>List of Alternatives Considered</u>

Mass Transportation Survey of 1959

- Auto Dominant Plan
- All Express Bus Rapid Transit Plan with Recommended Freeways
- Recommended Rapid Transit Plan with Recommended Freeways
- 1959 Recommended Plan

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NCTA Studies - 1962

All Highway System with No Additional Transit
All Highway System with Improved Bus Service
Minimum Highway Program with Rapid Transit
Recommended Transportation System

The 23.3 Mile Whitener Plan (1963)

The Authorized Rapid Transit System of 1965 (25 Mile Basic Plan)

No Rapid Rail Transit System (includes non-rapid rail transit alternatives or previous studies)

The Modified Rapid Transit System of 1967

Regional Test Alternatives (1967)

Alternative Test System A
Alternative Test System B
Alternative Test System C

Airlie IIA (1967)

The Proposed Regional System of 1967

The Adopted Regional System of 1968 (unmodified).

The Adopted Regional System of 1968 (revised February 7, 1969, June 11, 1970)

(Minor modifications to revised system have been made for the current proposed action.)

5. List of Federal, State and Local Agencies From Which Comments Have Been Requested and Others to Whom the Statement will be Circulated

Assistant Secretary on Environmental, Safety and Consumer Affairs, U.S. Department of Transportation

Honorable Walter E. Washington, Mayor-Commissioner
District of Columbia

Honorable Marvin Mandel
Governor of the State of Maryland

Honorable Linwood Holton
Governor of the CommonWealth of Virginia

Council of Environmental Quality

Environmental Protection Agency

Department of Agriculture

Department of Commerce

Department of Defense

Department of Health, Education and Welfare

Department of Housing and Urban Development
Urban Areas

Department of the Interior

Army Corps of Engineers

Office of Economic Opportunity

Federal Aviation Administration

Department of Transportation
Coast Guard

General Services Administration

Federal Highway Administration

Federal Railroad Administration

Interstate Commerce Commission

Advisory Council on Historic Preservation

Department of State Planning
Baltimore, Maryland (State Clearinghouse)

Division of State Planning and Community Affairs
Richmond, Virginia (State Clearinghouse)

Metropolitan Washington Council of Governments
(Regional Clearinghouse)

National Capital Planning Commission

Maryland Department of Transportation

Virginia Department of Highways

D.C. Department of Highways

Northern Virginia Transportation Commission

Washington Suburban Transit Commission

Alexandria City Council

D.C. City Council

Fairfax City Council

Fairfax County Board of Supervisors

Falls Church City Council

Montgomery County Council

Prince George's County Board of County Commissioners

Maryland-National Capital Park and Planning Commission

Northern Virginia Planning District Commission

Washington Metropolitan Area Transit Commission

D.C. Redevelopment Land Agency

6. Dates of Availability of Statement for Public Review

The Draft Environmental Statement for the Washington Metropolitan Area Regional System was made available to CEQ and for public review in February, 1973.

The Final Environmental Impact Statement is being made available for public review in August, 1975, at the Urban Mass Transportation Administration, Office of Capital Assistance, 400 - Seventh Street, S.W., Suite 9306, Washington, D.C. 20590.

and

The Washington Metropolitan Area Transit Authority, 600 Fifth Street, N.W., Washington, D.C. 20001.

* 6. added

INTRODUCTION

BACKGROUND

Planning for Washington's regional rapid rail system began nearly a quarter of a century ago when the National Capital Planning Act charged the National Capital Planning Commission (NCPC) with the responsibility of developing plans aimed at improving the movement of people and goods. In 1955, Congress authorized the NCPC and the National Capital Regional Planning Council (NCRPC) to conduct a 4-year Mass Transportation Survey. The results of the survey, presented in 1959, recommended rail rapid transit as part of a balanced system of highways and transit. In response to public hearings on the 1959 Survey Plan, Congress created a temporary federal agency, the National Capital Transportation Agency (NCTA) to begin planning the rapid rail system. In 1962, NCTA proposed an 83 mile rail transit system composed of 6 trunk lines radiating from downtown Washington.

Underlying this system was the wedges and corridors concept of the Year 2000 Policies Plan, published in* 1961 by the National Capital Regional Planning Commission (NCRPC). This plan proposed a series of corridors of urban development radiating away from Washington with wedges of open space between the corridors. A high speed transit and freeway system was proposed to run along the center of urban corridors, connecting all parts of the region with a circumferential freeway system. Centers of intensive commercial, industrial and residential development were proposed every few miles along the corridors to be served by rapid transit stops and freeway interchanges.

The extensive 83 mile regional system encountered difficulties in Congress and NCTA was requested to redesign it into a 25 mile system serving the District. In 1965, a 25 mile Modified Rapid Transit System largely within the District was re-submitted to Congress and approved as the nucleus of a regional system.

On February 20, 1967, the Washington Metropolitan Area Transit Authority (WMATA) came into existence after the execution of an interstate compact by Maryland, Virginia, and the District of Columbia, which had been authorized by Congress.

The Washington Metropolitan Area Transit Authority replaced the National Capital Transportation Agency, October 1, 1967, and is uniquely responsible and responsive to the jurisdictions of the District of Columbia, and the Maryland and Virginia suburbs although its funding comes from Congressional appropriations and these jurisdictions, and revenue bonds.

The legislation creating WMATA called for it to plan, develop, finance, and provide for the operation

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of the regional transit facilities, and coordinate the operation of all public and privately owned transit facilities to arrive at a truly regional system and to "expand the basic system authorized by the National Capital Transportation Act of 1965 into a regional system." Thus, WMATA was instructed to base the larger regional system upon the previously approved 25 mile system.

On March 1, 1968, after a series of conferences of local, state and federal officials and staff, and after extensive public hearings in each of the jurisdictions on the alternatives discussed at those conferences, WMATA adopted the 98.02 mile Regional Metro System. The construction of this system officially started December 9, 1969, the same day the President signed legislation authorizing federal participation in the system's construction.

Modifications to this Adopted Regional System have been necessary since 1968 to respond to constraints of engineering, the environment, and the concern of citizens and government agencies.

In 1973, WMATA acquired the operating assets of the D.C. Transit System, Inc., the Washington Virginia and Maryland Coach Company, the WMA Transit Company and the Alexandria Barcroft and Washington Transit Company in order better to coordinate bus and rapid rail to the fullest extent practicable into a unified regional transit system without unnecessarily duplicating service.

National and regional policy concerning the Metro rapid rail system has been most recently stated by President Ford who endorsed the completion of the entire 98 mile Metro rapid rail transit system June 16, 1975, and called upon William T. Coleman, Jr., Secretary of Transportation, to expedite solution of the system's financial problems. Current opinions of residents throughout the region are reflected in a public opinion survey conducted on the basis of a random sample of residents by County made for the Joint Committee on Transportation by the Bureau of Social Science Research in early 1975. A summary of the study's findings is as follows: between 73% and 80% of those interviewed in Prince George's County and the District of Columbia either approve or strongly approve completion of the regional rapid rail system. Between 80% and 88% of those interviewed in Arlington County, Fairfax County, Alexandria and Montgomery County either approve or strongly approve completion of the system. Asked if they would approve more local government bonds for their share of the cost, positive responses were given by 56% of those in the District, 58% of those in Arlington County, 67% of those in Fairfax County, 63% of those in Alexandria, 56% of those in Montgomery County and 50% of those in Prince George's County. 56% of those interviewed in the District strongly opposed eliminating the Mid-City Line, which is planned to serve both Anacostia and the upper 14th Street NW area.[1]

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[1]Jack Eisen "Ford wants full Metro Rail System" <u>The Washington Post</u>, June 17, 1975, page 1.

PURPOSE OF THE STATEMENT

The National Environmental Policy Act of 1969 established a broad national policy to promote efforts to improve the relationship between man and his environment, and provided for the creation of the Council on Environmental Quality (CEQ). The NEP Act sets out certain policies and goals concerning the environment, and requires that, to the fullest extent possible, the policies, regulations, and public laws of the United States are interpreted and administered in accordance with these policies and goals.

Section 102(2)c of the National Environmental Policy Act of 1969 (P.L. 91-190) requires that all federal government agencies include, in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed environmental impact statement.

Although WMATA is an interstate compact, not a federal agency, it voted to meet the spirit of the NEP Act and engaged the firm of Wallace, McHarg, Roberts and Todd to undertake an appraisal of the environmental impact of the Metro system. The WMATA staff has subsequently requested the preparation of an Environmental Impact Statement based on the appraisal. In addition more specific Environmental Impact Studies of the C, D, L, A, E, F, and B Routes have been prepared and are available for review from WMATA.

SCOPE OF THE STATEMENT

The National Environmental Policy Act of 1969 requires a detailed environmental impact statement by the responsible official on:

"(1) The environmental impact of the proposed action
(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented
(iii) Alternatives to the proposed action
(iv) The relationship between local and short-term uses of man's environment and the maintenance and enhancement of long-term productivity
(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."

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The agency responsible for the submission of the WMATA report as lead federal agency, the Department of Transportation, has issued guidelines for the content of impact statements stating the following points should be covered:

"(1) A description of the proposed action and its purpose ....
(2) The probable impact of the proposed action on the environment ....
(3) Any probable adverse environmental effects which cannot be avoided should the proposal be implemented ....
(4) Alternatives to the proposed action ....
(5) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity ....
(6) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented ....
(7) A discussion of problems and objections raised by other Federal agencies, State and local entities, and citizens in the review process and the disposition of the issues involved and the reasons therefor. (This section may be added at the end of the review process in the final text of the environmental statement.)" (DOT 5610-1A)

In this Report, the format of the Department of Transportation (DOT) is being followed in the environmental impact statement. More detailed information is presented in the Route Environmental Studies available from WMATA (see Appendix).

Environmental impact in this statement, as in guidelines for the implementation of the NEP Act, is broadly defined. It encompasses the ecology of both the natural and man-made environment, and its relationships to the visual, physical, cultural, and socio-economic aspects of the human experience. Impact factors used to categorize impacts so that relationships and trade-offs can be illustrated are divided into three groups: natural and ecological, socio-economic and cultural, and visual and physical. For this Report these are defined as follows:

Natural and Ecological Factors

Those factors relating to nature or natural processes, the atmosphere (air quality), soils, geology, water quality and hydrology (flood plains, surface and

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subsurface water), wildlife, vegetation, noise and other physiographic factors.

Socio-Economic and Cultural Factors

Those factors relating to people or human processes, their artifacts, such as historical or archeological sites, land uses or facilities, their functional relationships either existing or planned, including movement and traffic, and their social characteristics, such as population and employment distribution and community structure.

Visual and Physical Impacts

Those factors which relate to the individual or society's perceptions and interpretations of the man-made and natural environment; those elements of line, slope, space and form that comprise a visual experience, including scenic resources, the design of structures, and physical features.

METHODOLOGY

The methods used for this appraisal were designed to estimate the general impacts of a regional rapid transit system on the social and physical environment of the Washington metropolitan area.

In order to determine the major implications of building and operating the Metro system, the existing environment was investigated through field reconnaissance and a review of natural, physical and socio-economic data. When available, projections for the future of the region were also studied.

After the existing environment and future trends without Metro were assessed, the proposed Metro alignment and stations were investigated in terms of engineering, design, construction and operational characteristics. This was accomplished through interviews with the consultants and planning and engineering staff of WMATA, reviews of engineering and architectural plans and operational data, and on-site inspection of typical segments under construction.

The impact of the Metro system were then estimated in terms of three general categories: natural and ecological, socio-economic and cultural, and visual and physical. The estimates were based on the route appraisals and on analyses developed during the course of previous Metro environmental impact studies prepared for the C, D and L Routes and A013 segment of the A Route. They were supplemented by more extensive investigation, field reconnaissance and interviews with

WMATA staff and consultants where necessary and were aided by an identification of issues raised by citizens' groups, governmental agencies and individuals, as reported in public hearing records, written plans, and publications, WMATA correspondence and by personal contact with selected groups.

Federal Involvement in Preparation of the Environmental Impact Statement for the WMATA System

The following federal departments and agencies have been consulted in the preparation of the Environmental Impact Statement for the WMATA System:

- Department of Agriculture, Soil Conservation Service
- Department of Defense, Army Corps of Engineers
- Department of Housing and Urban Development
- Department of the Interior, Facilities and Government Lands
- Department of the Interior, National Park Service
- Department of the Interior, Bureau of Sport Fisheries and Wildlife
- Environmental Protection Agency, Office of Noise
- Office of Economic Opportunity
- Department of Transportation, Federal Aviation Administration
- Department of Transportation, Coast Guard
- General Services Administration
- Department of Transportation, Federal Highway Administration
- Council on Environmental Quality
- Smithsonian Institution
- Advisory Council on Historic Preservation

Communication with federal agencies has taken two forms essentially: first, communication during the process of preparation of the draft and final studies, and second, communication on agency comments on the draft studies circulated in accordance with NEPA requirements. Examples of the first are presented in Appendix A of Part 3 of this study. The second, agency comments on the draft study, are presented at the end of Part 1 of the study.

*Expanded

REVISED

SECTION 1: DESCRIPTION OF THE PROPOSED ACTION AND ITS PURPOSES

The following section is a general description of Metro route and station locations, construction and operating characteristics and projected ridership. This section is intended to give a broad overview of the Metro system, so that the subsequent analysis of environmental impacts can be understood in the context of the entire system.

PURPOSE

The proposed action contemplates construction and operation of a regional rapid transit system with eleven routes[1] and 98.02 miles of service traversing the District of Columbia and radiating outward to suburban communities in Maryland and Virginia.

The purpose of the Metro system is to provide rapid transit service to the Washington metropolitan area, thereby meeting WMATA's responsibilities as defined in the February 20, 1967 interstate compact which created WMATA and called for it to plan, develop, finance and cause to be operated improved transit facilities and to coordinate the operation of the public and privately owned or controlled transit facilities into a unified regional transit system.

ROUTE ALIGNMENTS

The Metro system is comprised of the following 11 routes described beginning with the northern A Route and proceeding clockwise around the radial system.

The Rockville (A) Route serves the northwestern portion of the District and the western half of Montgomery County. It begins in subway at Metro Center Station and follows G Street to 15th Street and then through Lafayette Square where it follows Connecticut Avenue north in tunnel to a point beyond Van Ness Center. There it turns to the Tenley Circle area and continues northwest in tunnel along Wisconsin Avenue to the Capital Beltway where it proceeds north to Rockville by means of surface and subway construction. The A Route includes 15.5 miles of service and 13 stations: 7 in the District and 6 in Montgomery County. An environmental impact study for the A Route was prepared in 1974 and presented at public hearing in the fall of 1974. The study includes a recommendation that the alignment be extended to a yard at Shady Grove. This recommendation is under consideration by WMATA at present. Copies of the study are available for review at WMATA.

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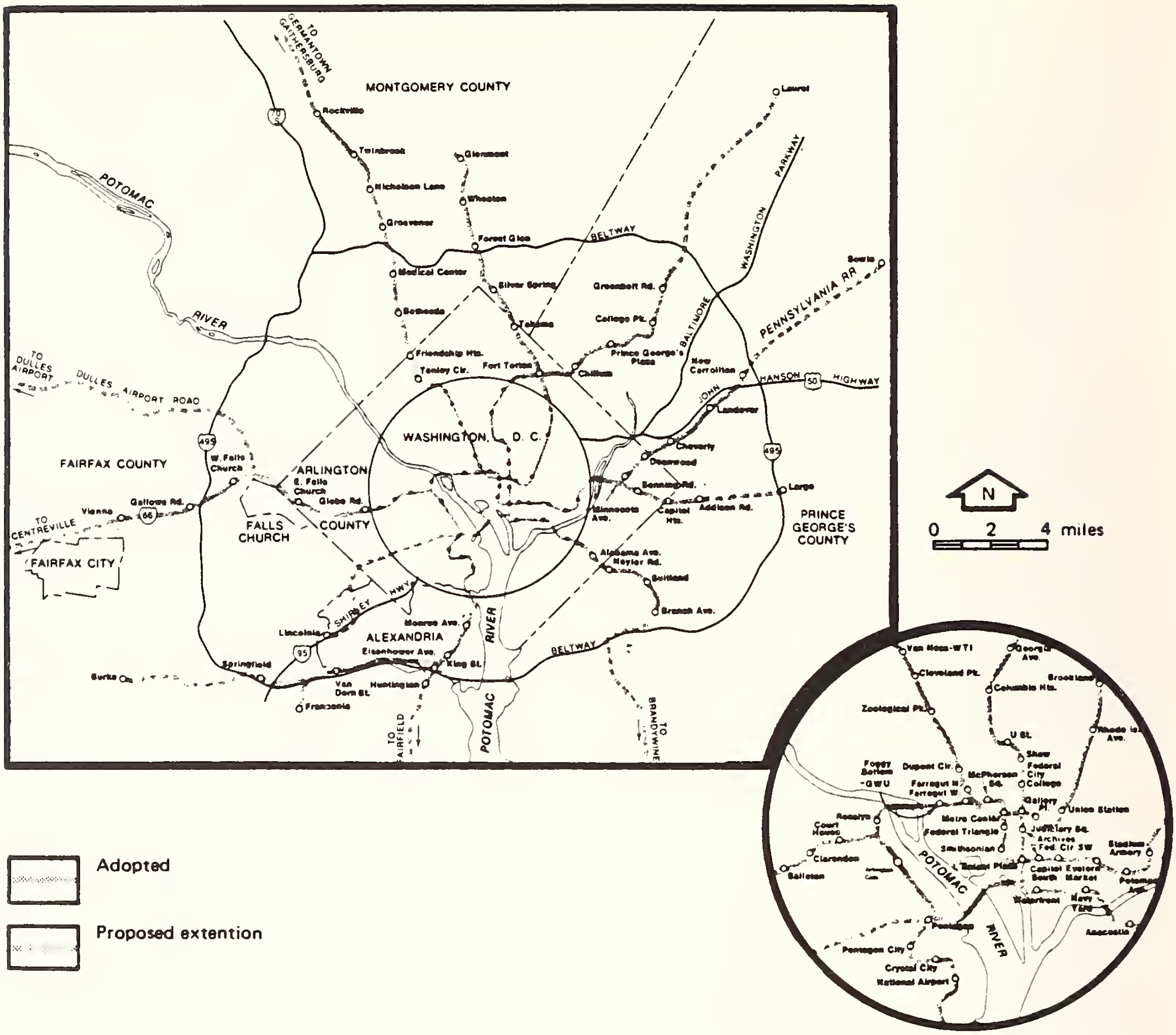
[1]Adopted Regional System routes.

The Glenmont (B) Route serves the north central portion of the District and central Montgomery County. This 13.7 mile route begins in downtown Washington just east of Metro Center Station at 10th and G Streets, N.W., and curves southeast in subway to Union Station and proceeds north adjacent to the Baltimore and Ohio Railroad in surface and aerial construction past Fort Totten where there is a transfer with the E Route.

NEW



Adopted

Proposed extention

NOTE:

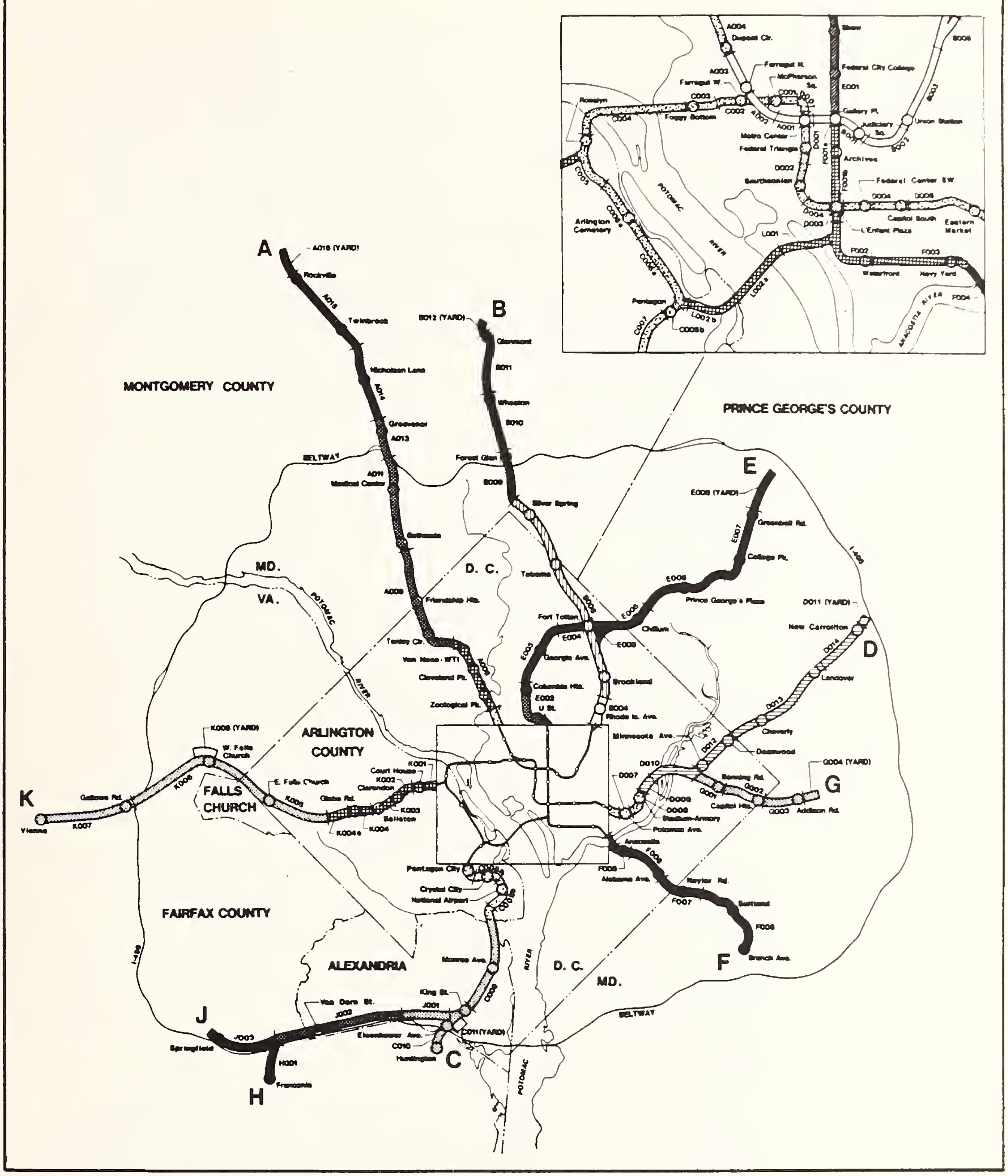
Proposed location of Eisenhower Avenue Station is indicated. Telegraph Road Station, proposed to be deleted, is not shown.

Adopted: March 1968

Revised: February 1969, June 1970

Authorized by Congress: December 1969

Map 1



June 1975	July 1978
May 1976	March 1979
July 1977	January 1980
November 1977	July 1981

CONSTRUCTION SCHEDULE

NEW

The route continues north past Takoma Park and Silver Spring, tunnels under the Beltway and proceeds past Forest Glen and Wheaton to a station and yard at Glenmont. There are 11 stations on the B Route excluding Gallery Place Station which is a major transfer point of the Metro System. Seven of the B Route stations are in the District, and four are in Montgomery County. An environmental impact study for the Glenmont (B) Route was prepared in 1974 and 1975 and presented at public hearings in April and May, 1975. The study includes 2 alternative vertical alignments in addition to the ARS alignment; 6 alternatives to the Wheaton ARS station, 7 alternatives to Forest Glen ARS station, 3 alternatives to the Glenmont ARS station and 6 alternatives to the ARS yard. Copies of the study are available for review at WMATA.

The Greenbelt (E) Route serves downtown Washington, the north central part of the District and northern Prince George's County. It originates in subway at Gallery Place Station and proceeds north on 7th Street past Federal City College through Shaw to Florida Avenue where it turns west to an alignment on U Street. At 14th Street it turns north again and continues in subway past Columbia Heights to an alignment centered on Kansas Avenue. It continues past a station at Georgia Avenue and turns east to a transfer point with the B Route at Fort Totten Station. The route proceeds east on surface through Chillum into Prince George's County, where it follows a northeastern alignment past Prince George's Plaza. It then changes to subway under Queen's Chapel Road and continues through the University Park area. Then the route turns north on an alignment adjacent to the Baltimore and Ohio Railroad and proceeds on the surface past stations at College Park and Greenbelt Road to a storage yard southwest of the Beltway. The E Route includes 11.1 miles of service and 11 stations, 7 of which are in the District. An environmental impact study for the Greenbelt (E) Route was prepared in 1974 and 1975 and presented at public hearings in March and May, 1975. The study includes a large number of permutations of vertical horizontal alignment and station locations in a corridor extending between Columbia Heights and either Greenbelt or the intersection of I-95 with the Beltway as alternatives to the ARS alignment. Copies of the study are available for review at WMATA.

The New Carrollton (D) Route serves southwest Washington and Prince George's County, Maryland. Originating in subway under 12th Street, at Metro Center Station, the route proceeds south through the central business district under 12th Street to Federal Triangle Station. It continues south under the Mall to Smithsonian Station, where it curves east to L'Enfant Plaza Station and continues east in subway stopping at 5 stations in southeast Washington before curving north and rising to an aerial structure north of the Stadium Armory Station. The route crosses the Anacostia River

*First and Second Para. expanded

REVISED

north of Benning Road Bridge and continues east to Kenilworth Avenue, and proceeds at-grade on railroad track right-of-way to the station at Minnesota Avenue. The route continues on a northeast alignment to Deanwood Station. Proceeding into Prince George's County, the route follows U.S. Route 50 past stations at Cheverly and Landover to a terminal and yard at New Carrollton. The D Route includes 11.9 miles of service and 14 stations: 11 stations in the District and 3 in Prince George's County.

The Addison (G) Route is a 3.2 mile branch from the D Route. It serves the section of the District and Prince George's County located between the D Route along

the John Hanson Highway and the F Route along the Suitland Parkway. The G Route begins at an intersection with the D Route in the vicinity of Benning Road and Kenilworth Avenue and crosses the railroad where it continues along Benning Road to a station at 45th Street. It proceeds east in subway to a station at Capitol Heights and enters Prince George's County where it terminates at a station at the intersection of Central Avenue and Addison Road. There are three stations on the G Route.

The 9 mile Branch (F) Route connects the southwest portions of the District and Prince George's County with downtown Washington. It begins south of Gallery Place Station and proceeds south under 7th Street past Archives and L'Enfant Plaza Stations to M Street where it continues east past stations at 4th Street and the Navy Yard. The route bears southeast and crosses under the Anacostia River in sunken tube directly south of the Anacostia Bridge. It passes stations at Minnesota and Alabama Avenues before surfacing and entering Prince George's County. The route then converts to aerial construction, stops at a station at Naylor Road, crosses Branch Avenue and changes to predominantly surface construction as it follows an alignment adjacent to the Suitland Parkway past the Naval Oceanographic Laboratory. It passes a station near the U.S. Bureau of the Census and continues south in subway and surface construction to a station at Branch Avenue. The F Route serves 6 stations in the District and 3 in Prince George's County, for a total of ten stations. An environmental impact study for the Branch Avenue (F) Route is in preparation at the present time. Public hearings are tentatively scheduled for Fall, 1975. The study includes one alternative alignment to ARS and two ways in which the rail system can be enlarged in the future.

The Huntington (C) Route provides service between northern Virginia and downtown Washington. It begins under Eye Street just north of Metro Center, extends in subway past stations at McPherson and Farragut Squares, and continues past George Washington University and Foggy Bottom to a tunnel crossing under the Potomac River north of Theodore Roosevelt Island into Rosslyn, Virginia. From Rosslyn, the route surfaces east of Jefferson Davis Highway, parallels the river with a station at Arlington National Cemetery and then converts to subway as it approaches the Pentagon Station. It continues through the Jefferson Davis Corridor with underground stations at Pentagon City and Crystal City to an aerial station at National Airport. After the airport, it proceeds south along the Potomac Railroad Yards and past three stations and a yard in Alexandria to a terminal at Huntington in Fairfax County. There are 13 stations on the 11.7 mile Huntington Route: 3 in the District and 9 in Virginia. The station at the Pentagon is a major transfer point with the L Route.

*Second paragraph expanded

An environmental impact study for the C, D, and L Routes was prepared in 1973 and is available for review at WMATA.

The Springfield (J) Route connects with the C Route and provides service to Alexandria and part of Fairfax County. This 6.6 mile route begins south of theDing Street Station on the C Route and follows a

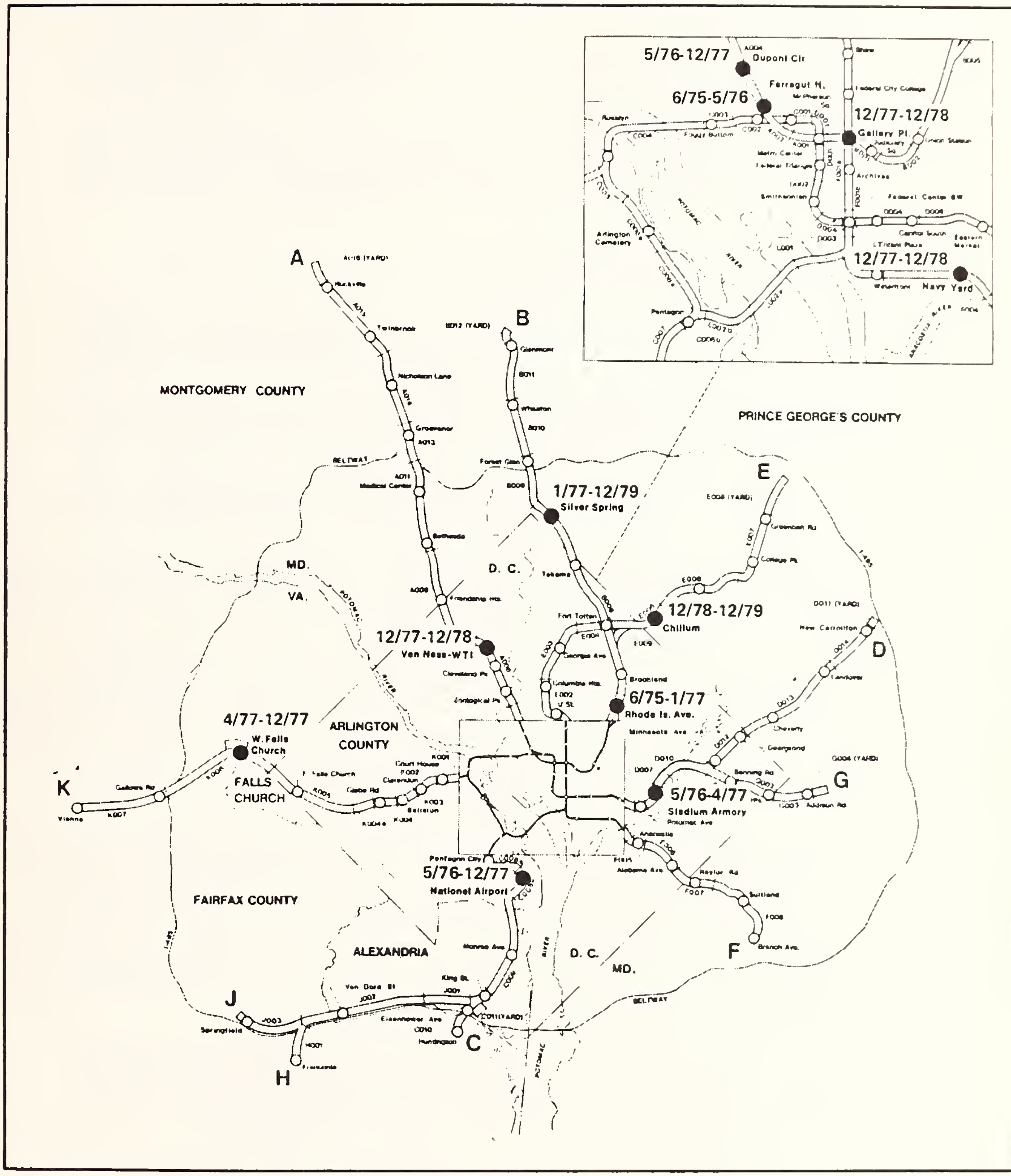
NEW

western alignment located between the Capital Beltway and the Richmond, Fredericksburg, and Potomac, Railroad and the Southern Railway. It is a predominantly surface line with a station at Van Dorn Street in Alexandria and a terminal at Springfield.

The 1.3 mile Franconia (H) Route branches off the J Route south of Brenmar Park and follows the Richmond Fredericksburg and Potomac Railroad right of way on surface to a terminal station at Franconia Road. An environmental impact study for the Springfield (J) and Franconia (H) Routes was prepared in 1974 and 1975 and presented at public hearings in May, 1975. The study includes an alternative to the ARS alignments eliminating the Springfield (J) Route and extending the Franconia (H) Route. The study includes 3 alternatives to the ARS Springfield station location, and 2 alternatives to the ARS Franconia station location. Copies of the study are available for review at WMATA.

The Vienna (K) Route connects Northern Virginia's Rosslyn-Vienna Corridor with the C Route to downtown Washington. It orginates south of Rosslyn Station and curves west in tunnel past the Court House Station in Arlington's central business district to an alignment in the vicinity of Fairfax Drive. It proceeds west along Fairfax Drive in subway past stations at Clarendon, Ballston and Glebe Road. Before reaching the East Falls Church Station, it converts to a surface line in the median of the proposed I-66 highway and turns northwest to a station at West Falls Church. The route proceeds west parallel to center Street in the median, over the Beltway on an aerial structure to a station at Gallows Road. It then follows an alignment in the median of existing I-66 to a station at Gallows Road to a terminal at Vienna station near Vienna, Virginia. The K Route provides 12 miles of service with 8 stations.

The L'Enfant-Pentagon (L) Route passes through the corridor of bridges crossing the Potomac River concentrated near 14th Street and connects the routes serving Northern Virginia with downtown Washington. This 2.2 mile route begins in southwest Washington south of the L'Enfant Plaza Station, and proceeds in subway under the Washington Channel to East Potomac Park. It bridges the river midway between the railroad bridge and the north bound I-95 highway bridge. On the Virginia side, it crosses over the George Washington Memorial Parkway, returns to a subway and continues under I-95, Boundary Drive and the Jefferson Davis Highway to its junction with the Huntington Route. There are no stations on this link of the Metro system, which ends just prior to both the L'Enfant Plaza Station and the Pentagon Station. An environmental impact study for the C, D, and L Routes was prepared in 1973 and is available for review at WMATA.



Interim terminal

12/77 Date of Interim status

INTERIM TERMINALS

NEW

metro

In total the 11 routes include 38 miles of service and 43 stations in the District, 30 miles and 22 stations in Maryland, and 30 miles and 21 stations in Virginia. In the highly developed parts of the region, the routes are underground. Forty-nine of the 98 miles in the system are in subway and 53 of the 86 stations are underground. Of the 42 miles of surface construction, 30 are along existing railroad rights-of-way or in medians mostly on grade separations and bridges.

INTERIM TERMINAL STATIONS

Interim terminal stations are designated on the accompanying map and chart. These stations will be interim pedestrian termini only and not train termini which involve yards. However, at each interim terminal there will be tail tracks which will allow the trains to turn around.

An interim bus feeder system to service these stations is presently being developed by WMATA consultants. In addition to a greater number of buses servicing each station during its interim terminal phase, it is projected that the number of kiss-n-ride arrivals will increase. The projected number of kiss-n-ride arrivals is currently being updated by WMATA consultants.

Due to the relatively short duration of the interim period WMATA is relying on curb drops rather than planning additional parking bays for either buses or kiss-n-ride cars. For the same reason and in an effort to conserve scarce land resources the Authority has not planned additional parking spaces for either cars or bicycles at interim termini.

Several strategies aimed at getting riders to and from interim stations are under consideration. Alternative feeder bus routes are being studied (see Appendix D Metro Characteristics in Part III of this report). Plans to increase the number of buses servicing interim stations as well as plans to provide several temporary fringe parking facilities for commuters are also under advisement. The preparation of an area-wide car and bus pooling plan is underway which will include the following elements:

1. Development of techniques for identifying and matching potential car and bus pools;

2. Determination of car pool incentives;

3. Facilitation and regulation of car pooling;

4. Preparation of marketing and promotional programs;

5. Preparation of monitoring plan;

6. Exploration of special car pool lanes.[1]

The preparation of this plan will cost $50,000, of which DOT is providing $25,000; EPA, $23,750 and local sources will provide $1,250.

Simultaneously, a program is proposed to demonstrate how the Areawide Car and Bus Pool Program for the National Capital Region initiated in 1973 by the Board of Directors of COG "can be continued and expanded to achieve and insure success in measurable terms".[1]

In addition to programs relating to car and bus pools, it has been suggested that the Montgomery County Government subsidize community organizations seeking to establish commuter contract charter bus service. Interest in such charter service has already been demonstrated by various outlying communities in the County.

Notwithstanding the above strategies, foreseeable interim impacts are an increase in congestion in the vicinity of and at interim termini as well as an increase in the use of curb space for parked vehicles. Additional feeder buses, fringe parking facilities, car and bus pools, and charter buses can mitigate these impacts but cannot eliminate them.

The Silver Spring Station poses particular problems as it is intended to be an interim terminal for nearly three years. A study is being conducted by the Montgomery County Department of Transportation to determine means to alleviate or minimize the particular interim impacts at this station and its vicinity. M-DOT has already deemed it necessary to supplement Metro buses with minibuses for this service area.

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[1]National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, "Short-Range Transit Development Program for the Washington Metropolitan Area", p.49.

Interim Terminal	Date of Interim Status	Length of Interim Status
Farragut North	June 1975-May 1976	11 Months
Rhode Island Avenue	June 1975-January 1977	19 Months
Dupont Circle	May 1976-December 1977	19 Months
Stadium-Armory	May 1976-April 1977	11 Months
National Airport	May 1976-December 1977	19 Months
Silver Spring	January 1977-December 1979	35 Months
W. Falls Church	April 1977-December 1977	8 Months
Van Ness-WTI	December 1977-December 1978	12 Months
Gallery Place	December 1977-December 1978	12 Months
Navy Yard	December 1977-December 1978	12 Months
Chillum	December 1978-December 1979	12 Months

Metro is being constructed by several different methods. Cut-and-cover construction will be used extensively. A trench is excavated and then covered with planks at street level to maintain traffic during construction. Earth and rock tunnel and sunken tube construction will be used in several segments of the system. Aerial structures and on-grade trackage will also be used.[1]

Stations will be located and designed for easy access. To simplify bus-rail transfers, loading platforms will be provided. Approximately 29,000 parking spaces will be available to Metro riders at stations where automobile access is anticipated. Loading zones and parking spaces will also be provided for the convenience of kiss-and-ride passengers.

Station design is unified throughout the system. While there will be variations among stations, all will have common elements. Subway stations will be constructed of concrete with high, column-free ceilings, exposed and coffered. Nothing will touch the vaulted walls; the escalators, mezzanines and train platforms in both side and center platform stations will be free-floating within the vaulted structure. At the mezzanine level, the rider will have an unobstructed view of the station. Natural colors of exposed concrete walls and vaults, reddish-brown quarry tile floors and bronze fixtures characterize all stations. Benches, kiosks, fare vending and collecting equipment will be of unified design to blend with the station architecture.

On the surface, subway stations will be discrete with entrances marked by a square pylon with the Metro symbol. Aerial and on-grade stations will be simple, straightforward structures of concrete and glass, with wind shelters and radiant heating systems. Subway stations will be air-conditioned and constructed with acoustical materials to reduce noise. Trains will run on neoprene pads throughout the system.

Cars holding up to 81 passengers and 94 standees will run in train pairs of up to eight cars. An automatic train control system will regulate train speed and spacing, start and stop trains, operate doors and monitor train performance. All train control activity will be monitored at Metro's operation control center. Train attendants will be able to override automatic operations if necessary. Metro will also have an automatic fare collection system.

The ride in the air-conditioned cars will be smooth. Grades and curves will be gradual. The cars will have steel wheels suspended in cushioned bogies running on padded, continuously welded rails. Electric trains will

1 Additional description of the construction process is presented in Metro System Characteristics, on page 18(a)

* New Footnote 1 REVISED

Table 1:
Metro System Route Lengths by Type of Construction

Route	Total Revenue Lengths: Miles	Total Revenue Lengths: Linear Feet	Cut & Cover Subway: Line	Cut & Cover Subway: Station	Rock Tunnel Subway: Line	Rock Tunnel Subway: Station	Earth Tunnel: Line	Sunken Tube: Line	Surface: Line	Surface: Station	Freeway Median: Line	Aerial: Line	Aerial: Station
A Rockville	15.52	81,922	14,850	2,397	37,590	6,372	2,252	–	14,110	2,260	–	2,070	–
B Glenmont	13 65	72,078	6,301	3,135	21,330	1,600	–	–	32,541	2,824	–	3,640	707
C Huntington	11.72	61,854	13,752	4,515	7,761	720	2,707	–	20,454	1,530	–	8,958	1,455
D New Carrollton	11 93	62,966	5,057	7,161	–	–	12,883	–	25,220	3,050	–	9,595	–
E Greenbelt	11.10	58,708	7,260	4,390	–	–	20,785	–	16,723	3,060	–	6,490	–
F Branch	8.98	47,420	6,169	5,406	–	–	18,675	1,250	12,110	1,520	–	1,570	720
G Addison	3 18	16,750	11,850	2,400	–	–	2,500	–	–	–	–	–	–
H Franconia	1.26	6,650	–	–	–	–	–	–	5,920	730	–	–	–
J Springfield	6 59	34,790	620	–	–	–	–	–	29,900	2,260	–	2,010	–
K Vienna	11 96	63,125	9,693	3,030	4,497	–	–	–	250	2,400	41,280	1,765	210
L L'Enfant—Pentagon	1.65	8,700	3,120	–	–	–	150	1,550	840	–	–	3,040	–
Total Linear Feet	–	514,963	78,673	32,434	71,178	8,692	59,954	2,800	158,068	19,634	41,280	39,158	3,092
Total Miles	97 54	–	14 90	6.14	13.48	1.65	11.36	0.53	29.94	3.72	7.82	7.41	0.59

Source WMATA, 1-25-72.

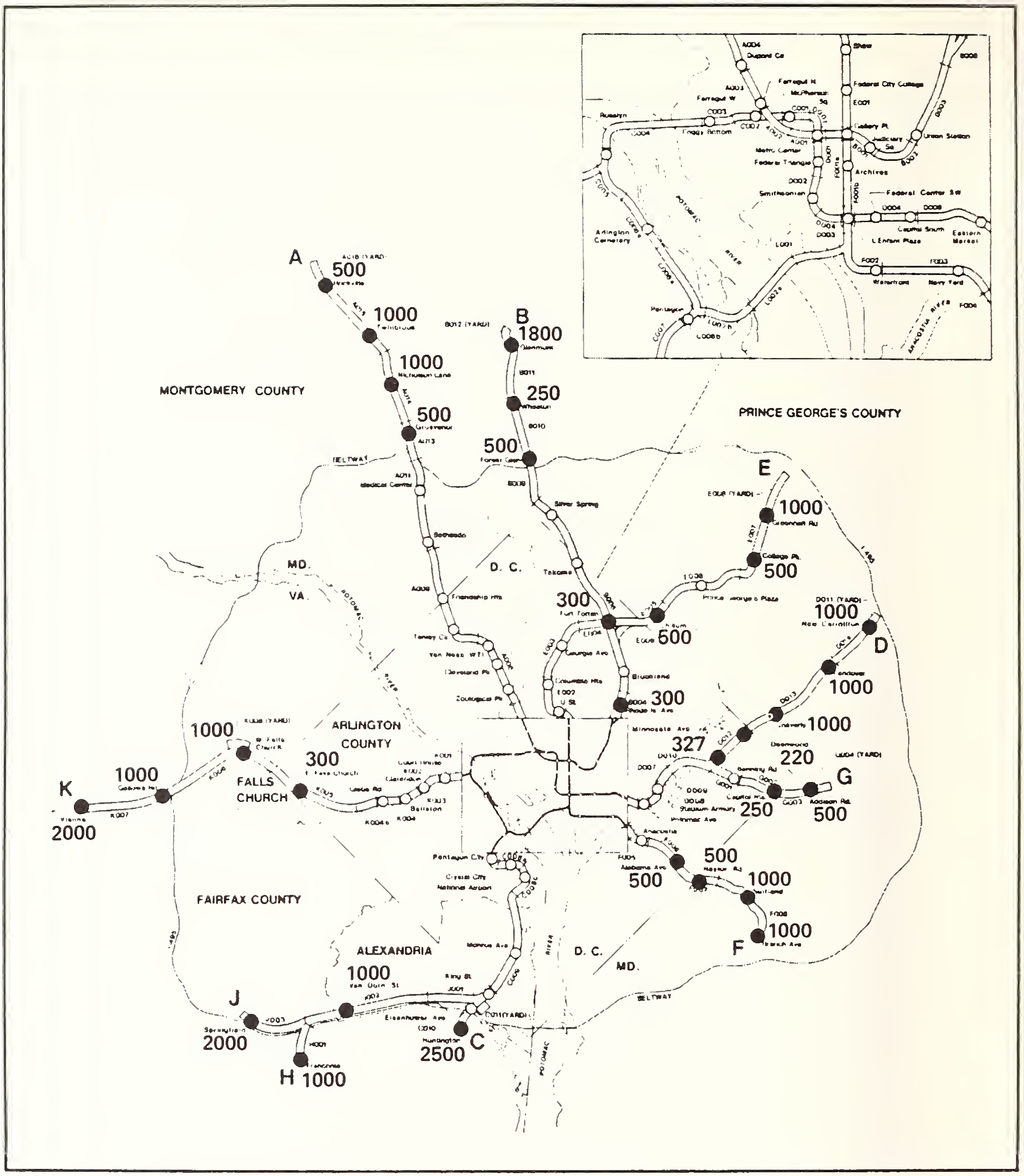
Note: <u>Revised WMATA Standard Coding and Stationing Manual</u>, January, 1975, gives total system revenue length of 98.05 miles.

*Total system revenue mileage updated

REVISED

REGIONAL RAPID RAIL SYSTEM

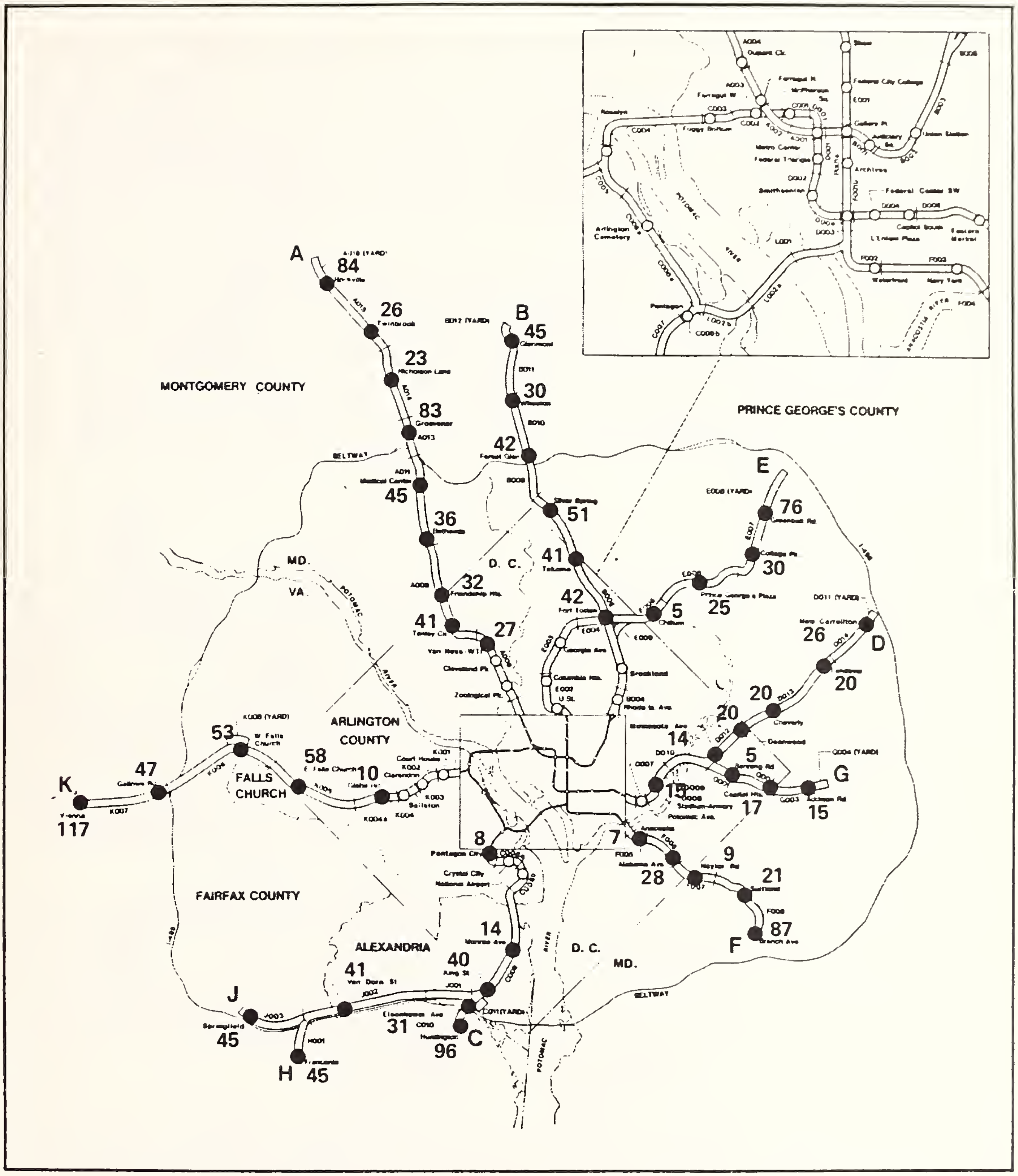
Map 2



1000 Park and ride

PROPOSED VEHICULAR FACILITIES

NEW

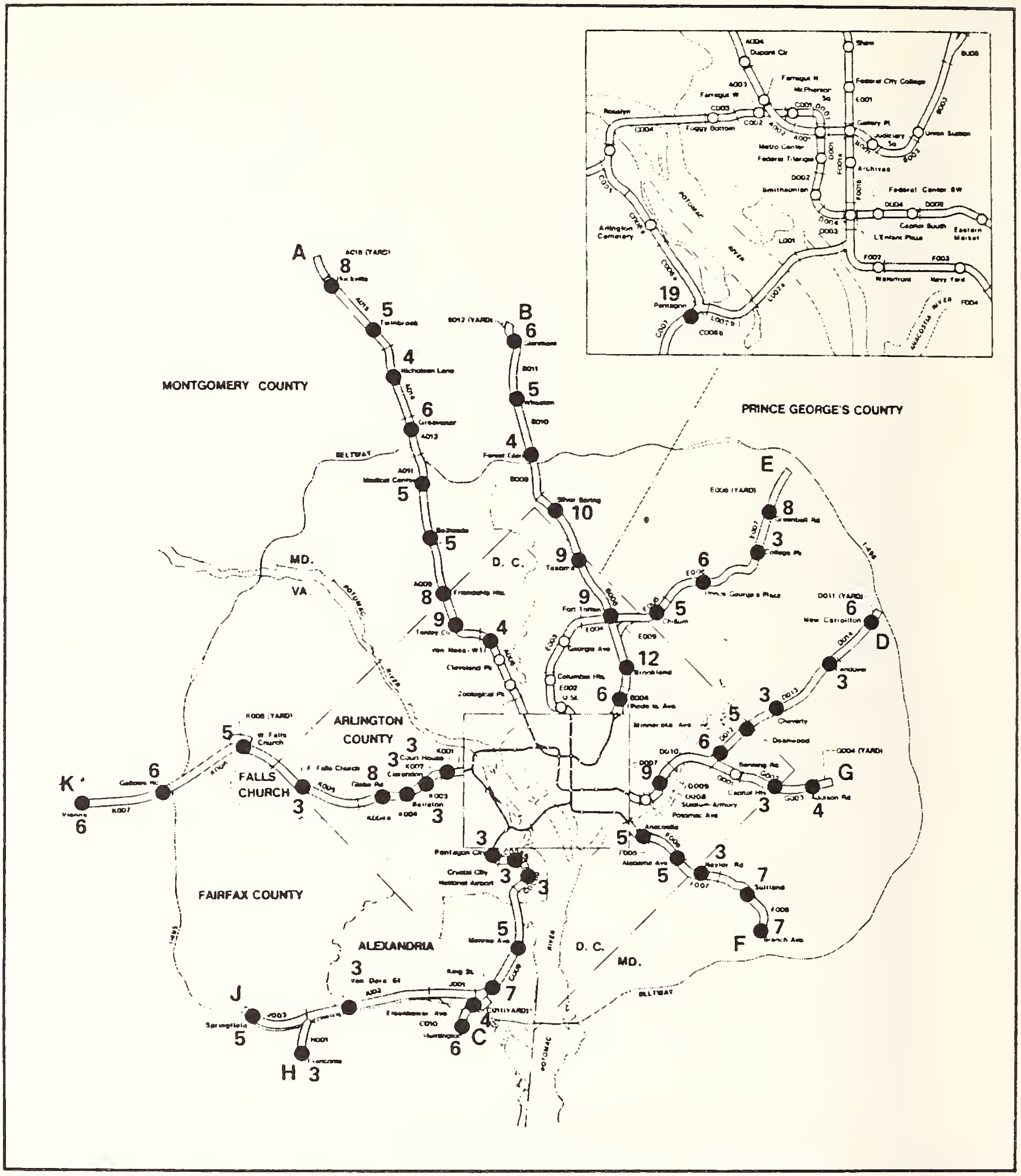


58 Kiss and ride

PROPOSED VEHICULAR FACILITIES

metro

NEW



b Bus bays

PROPOSED VEHICULAR FACILITIES

NEW

metro

operate on Metro's exclusive right-of-way not interrupted or slowed by other traffic. Service will be provided over a 20-hour period from 5 a.m. to 1 a.m. Train schedules during typical weekday peak periods will offer 2 to 4 minute service. During the remainder of the day, trains will run every 6 minutes except during late evening and early morning hours when they will run every ten minutes. Trains will reach top speeds of 75 miles per hour and will average 35 miles per hour including stops.

A "Manual of Landscape Development Standards" has been prepared for the entire system by WMATA consultants. This manual provides criteria and standards of landscaping at Metro entrances and along the right-of-way throughout the 98.02 mile system. The intent of the document is to provide attractive and appropriate landscape materials to embellish the appearance of the entrances and right-of-way. This landscape work will be coordinated with the National Park Service and other public bodies in the metropolitan area.

RIDERSHIP[1]

WMATA anticipates an integrated rail-bus system serving 350 million annual transit trips in 1990. Of these trips, 78.1 million are to be by rail only, 78.3 million by bus only, and 195.6 involving a combination of rail and bus.

Most of the Metro riders are expected to arrive and depart from stations by bus or on foot. Only a small proportion are expected to use automobiles for access to Metro. Projections for the average 24-hour period in 1990 indicate that 47.3% of the Metro riders will walk to and from stations and 46.6% will ride buses. During the a.m. peak hour, most riders are expected to arrive by bus and depart on foot, whereas, during the p.m. peak hour the arrival and departure modes are reversed.

Referring to the Table on Daily Volume by Station, it can be observed that projected ridership varies considerably among stations. In general, stations in downtown Washington are projected to serve the greatest number of passengers. A substantial volume of passengers, however, is expected at stations serving high intensity suburban developments, large Federal employment center in outlying locations, and tourist destinations.

[1]Modified ridership and modal split projections based upon the draft 1974 Net Income Analysis are set out in the following pages. It should be noted that only total figures by route and for the whole system from the 1974 draft are available for inclusion in this statement.

*Footnote added REVISED

ALTERNATIVE FARE STRUCTURES

	Separate Fares (#1)	Free Transfer (Combined Fare) Low Fare (#2)	Free Transfer (Combined Fare) Moderate Fare (#3)
Base Fare on Boarding	25¢	25¢	40¢
Added Bus Zones (3± Miles)	15¢	15¢	20¢
Added Rail Charge (Each Mile after 3)	5¢	5¢	7¢
Transfers:			
Rail-Rail	0	0	0
Bus-Rail, Bus-Bus	25¢	0	0

Source: WMATA Draft NIA, 1974

THREE ALTERNATIVE FARE SYSTEMS ANALYZED

System 1 -- Separate Fares Between Bus and Train, Bus-To-Bus
(55¢ Average Fare Resulted)

System 2 -- Free Transfer, Low Fare
(41¢ Average Fare Resulted)

System 3 -- Free Transfer, Moderate Fare
(62¢ Average Fare Resulted)

Source: WMATA Draft NIA, 1974

1990 Basic Patronage Estimate

PATRONAGE (Millions)

	Separate Fares (#1)	Free Transfer (Combined Fare) Low Fare (#2)	Free Transfer (Combined Fare) Moderate Fare (#3)
Annual	467	484	457
Weekday	1.61	1.67	1.58

Existing Weekday Metrobus Riders: 400,000--450,000

Source: WMATA Draft NIA, 1974

NEW

1990 NET INCOME COMPARISON

	Millions of Dollars			
		Free Transfer (Combined Fare)		
	Separate Fares (#1)	Low Fare (#2)	Moderate Fare (#3)	1971 Estimate (1970$)
Total Revenue	$282.9	$223.1	$308.2	$203.8
Total Expenses	287.6	296.8	286.5	107.2
Net Income	(4.7)	(73.7)	21.7	96.6

Source: WMATA Draft NIA, 1974

1990 ANNUAL SYSTEM EXPENSE COMPARISON

	Millions of Dollars			
		Free Transfer (Combined Fare)		
	Separate Fares (#1)	Low Fare (#2)	Moderate Fare (#3)	1971 Estimate (1970$)
Bus System	$156.3	$162.5	$156.1	$ 69.1
Rail System	$127.9	$130.9	$127.0	$ 38.1
Other Management	3.4	3.4	3.4	NA
Total	$287.6	$296.8	$286.5	$107.2

Source: WMATA Draft NIA, 1974

1990 PATRONAGE COMPARISON

Millions of Annual Revenue Passengers In Basic Estimate

	Separate Fares (#1)	Free Transfers (Combined Fare) Low Fare (#2)	Moderate Fare (#3)	1971 Estimate (1970 Data)
Bus Only	167	170	160	65
Rail Only	118	115	109	63
Combined	182	199	188	196
Total	467	484	457	324

Source: WMATA Draft NIA, 1974

REVISED RIDERSHIP FIGURES, BY ALIGNMENT, 1974
INBOUND RIDERS NEAR DOWNTOWN 1990 A.M. PEAK HOUR

Route	1974 Estimate Fare System #1	1971 Estimate
Rockville	11,900	21,200
Glenmont	18,300	20,200
Greenbelt Road	11,800	13,600
Addison Road/New Carrollton	17,200	15,100
Branch Avenue	15,800	15,400
Springfield/Franconia	10,000	11,700
Huntington	8,400	10,100
Vienna	16,500	14,000
Total Inbound	109,900	121,300

Source: WMATA Draft NIA, 1974

The conclusions of the draft 1974 Net Income Analysis accompanying the figures set out above include the following observations:

1. The study projects 40 to 50% more riders than the 1971 estimate but 10% less into downtown in the morning peak.

2. In 1990, among alternative fares analyzed:

   a. patronage changes are moderate

   b. operating expense changes are slight

   c. revenue changes are great

3. Systems studied attract many more riders than previously estimated.

4. Increase is in reverse riding, suburban crosstown and off-peak periods.

5. Rail operating costs are higher.

The tables on the following pages set out modal choice estimates from the 1974 revised net income analysis. Modal split assumptions made by the Virginia Department of Highways, the Maryland Department of Transportation and in the Transportation Plan element of the Comprehensive Plan for the National Capital are based directly upon modal split projections used by the Washington Council of Governments. The Maryland Department of Transportation's Western Prince George's County Transportation Alternatives Study of 1973 includes minor variations in modal choice on the Greenbelt (E) Route with variations in the location of the portion of the alignment in Prince George's County.

COMPARISON OF RECENT HOME BASED WORK MODAL CHOICE RESULTS
FOR THE WASHINGTON METROPOLITAN AREA

Simulation Projection Year	1968 Observed Home Interview	1980 Simulation Transit Tech. Studies	1992 NIA Fare Test #1	1992 NIA Fare Test #2	COG/TPB 1973 Certification Simulation (dist.models)	AMV 1971 Net Income Analysis Study
Percent Regional Modal Choice	20	33	33	34	32	27*
Percent Modal Choice to Core	37	61	57	58	53	56**

* 24 hr.
** Peak 2 hr.

Source: WMATA Draft NIA, 1974.

NEW

1974 WMATA NET INCOME ANALYSIS STUDY

UNADJUSTED MODAL CHOICE ESTIMATES - 1992

PURPOSE	PERCENT MODAL CHOICE Fare System #1		PERCENT MODAL CHOICE Fare System #2	
	Regional	To Core	Regional	To Core
WORK	32.9	56.5	33.8	57.6
NON WORK	10.7	37.0	11.2	38.4
NON HOME BASED	6.1	13.2	6.3	13.3
TOTAL	15.5	42.5	16.1	43.7

Source: WMATA Draft NIA, 1974.

NEW

Table 3: Annual Transit Patronage by Trip Type 1990, for Adopted Regional System and Bus System

Trip Type	Patronage	
	Number	%
Rail Only	63,200,000	19.5
Bus-Rail, Rail-Bus	148,700,000	45.8
Bus-Rail-Bus	46,900,000	14.4
Bus Only	65,300,000	20.1
Total	324,100,000	99.8

Source: WMATA-T, RO-1971 (Does not include school, tourist & external trips)

Table 4: Mode of Arrival for Metro System for 24-Hour Period in 1990

Walk		Bus		Drive & Park		Auto Passenger		Kiss-n-Ride		Total	
Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
453,476	47.3	446,585	46.6	29,208	3.0	5,852	.6	23,839	2.5	958,960	100.0

Source: WMATA, NIA, 1969

Table 5: Mode of Arrival or Departure AM*, Peak One Hour in 1990, for Adopted Regional System

Mode of Arrival												Mode of Departure				
Walk		Bus		Drive & Park		Auto Passenger		Kiss-n-Ride		Total		Walk		Bus		Total
Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
29,011	19.2	97,936	65.0	11,800	7.8	2,363	1.6	9,627	6.4	150,737	100.0	111,106	73.7	39,631	26.3	150,737

*To obtain P.M. figures, reverse the Arrival and Departure figures.

Source: WMATA, NIA, 1969

Note: Updated figures for these tables are not yet available from the 1974 Net Income Analysis.

Table 6: Projected Daily Volume by Station, 1990

Station	Trips	Station	Trips
Addison	10,730	Huntington	11,678
Alabama	20,246	Judiciary Square	24,118
Anacostia	31,938	King Street	28,938
Archives	23,980	Landover	13,280
Arlington Cemetery	14,800	L'Enfant Plaza	66,800
Ballston	13,148	McPherson Square	54,470
Bethesda	22,222	Medical Center	16,296
Benning Road	7,368	Metro Center	81,584
Branch Avenue	21,470	Minnesota Avenue	15,000
Brookland	21,012	Monroe Avenue	8,410
Capitol Heights	6,476	Naylor Road	4,448
Capitol South	34,530	National Airport	34,000
Cheverly	7,990	New Carrollton	18,866
Chillum	14,642	Navy Yard	29,476
Clarendon	10,884	Nicolson Lane	15,050
Cleveland Park	7,766	Pentagon	49,080
College Park	6,338	Pentagon City	29,626
Columbia Heights	31,074	Potomac Avenue	17,246
Court House	37,534	Prince George's Plaza	5,130
Crystal City	30,356	Rhode Island Avenue	17,918
Deanwood	11,920	Rockville	35,200
Dupont Circle	65,152	Rosslyn	42,592
East Falls Church	18,474	Shaw	19,400
Eastern Market	9,386	Smithsonian	34,700
Eisenhower	16,044	Springfield	13,582
Farragut North	68,386	Silver Spring	31,942
Farragut West	54,034	Suitland	20,422
Federal Center, SW	10,542	Stadium Armory	16,500
Federal Triangle	28,614	Takoma	27,444
Federal City College	14,800	Tenley Circle	25,624
Foggy Bottom	45,436	Twinbrook	10,272
Forest Glen	12,042	U Street	15,260
Fort Totten	33,568	Union Station	39,600
Franconia	6,700	Van Dorn	12,394
Friendship Heights	27,852	Van Ness	24,110
Gallery Place	31,928	Vienna	29,362
Gallows Road	8,674	Waterfront	28,522
Georgia Avenue	40,000	West Falls Church	15,426
Glebe Road	17,910	Wheaton	15,538
Glenmont	20,854	Zoological Park	18,952
Grosvenor	7,390	Totals	2,857,924
Greenbelt Road	19,492		

Source: WMATA, NIA-1969, as revised.

Note: Updated figures for this table are not yet available from the 1974 Net Income Analysis.

CONCEPT AND DESIGN CRITERIA

The concept of Metro to provide a rapid transit rail system required the development of General Design Criteria establishing design parameters for the system. Primary considerations in the development of these criteria were: that the system must be safe, rapid and comfortable, and must be designed in accordance with accepted current engineering practices.

The factors of speed, safety and comfort expressed themselves through the engineering design process, establishing basic design parameters in the overall geometry of the Metro system. For example, a sharp, sudden, horizontal curve would be undesirable because it would require an operational reduction of speed to assure the comfort of the passengers.

Just as the curvature, or horizontal alignment of Metro was developed from the general criteria, the rise and fall of the tracks (called vertical alignment) was developed through similar considerations of speed, safety and comfort.

Because the performance characteristics of the vehicle alter the design of horizontal and vertical alignment requirements, Metro assumed the characteristics of a "typical" rapid transit vehicle, so that the vehicle options available to Metro would not be restricted.

Horizontal Alignment

1. General

In designing curves into the alignment, every attempt was made to maintain a minimum design speed of 40 miles per hour. Wherever possible the geometrics were designed to accommodate the maximum design speed of up to 75 miles per hour.

Calculations indicated that for mainline running track the desirable minimum radius of a horizontal curve is 755 feet and the absolute minimum is 500 feet. The desirable minimum length of horizontal curve was established to be 100 feet. However, if required and approved, the curve may be less than 100 feet.

To a limited extent, the speed through curves could be increased, without decreasing comfort, by banking the track; however, this banking, called superelevating or superelevation, could yield limited returns. If a track section were severely banked, like the sides of a race-track, as opposed to the slight banking along highway, the ride for passengers, were the train to operate at reduced speed, would be very uncomfortable. Therefore, while tracks through curves are superelevated, curves throughout the system are relatively gentle. The maximum actual superelevation for the system is:

(1) For routes running in tunnels or in cut and cover structures, 4 inches.

(2) For routes running at grade or on elevated structures, 6 inches.

Tangent lengths, or the straight sections of track between curves also required minimum specifications. Where a left curve immediately follows a right curve, for example, Metro passengers would experience an unpleasant rocking from one side to another. The tangent section helps to eliminate this rocking. The desirable minimum tangent length is calculated to be 200 feet; while the absolute minimum is 75 feet.

At rapid transit stations the horizontal alignment is tangent throughout the 600-foot platform length and continues tangent for a minimum distance of 65 feet beyond each end of the station platform.

Vertical Alignment

As stated earlier, the rises and falls of the vertical alignment required the development of minimum/maximum criteria designed to eliminate a roller coaster (rapid up and down) ride. In addition, grades provide for drainage of the tracks. Grades are expressed in terms of the percentage of number of feet rising (+%) or falling (-%) over 100 foot lengths.

Metro specifications state that the desirable maximum grade for mainline running track shall be 4.0 percent. In exceptional circumstances, such as splitlevel junctions and other isolated cases, the maximum grade of 4.0 percent may be increased to 5.0 percent, on down grades only. The minimum grade in underground and aerial structures shall be 0.35 percent to accommodate drainage runoff. Except at stations, there is no minimum grade for at-grade construction; in this case drainage ditches shall be sloped as

necessary to accommodate runoff. A desirable grade of 0.35 percent shall be held through underground and aerial stations. Any constant grade from 0.35 percent to 0.20 percent is acceptable for at-grade stations. Under exceptional circumstances, grades through stations may be increased with permission of Authority and the General Consultants. In yard and secondary tracks, the maximum grade shall be 1.0 percent. The minimum grade desired shall be 0.35 percent, except for storage tracks, where the desirable grade shall be 0.20 percent. Permanent stub end tracks should be sloped away from the turnout. Storage tracks should have a sag in their profiles to prevent the cars from drifting back onto the main track.

Changes in grade such as a rise to a fall are connected by parabolic vertical curves. However, just as in horizontal curves requiring a tangent section, vertical curves are separated by minimum constant grade sections. The desirable minimum length of constant profile grade between vertical curves shall be 100 feet. These minimum constant grade sections between grades lessen elevator effects. To ensure the maximum comfort and safety of passengers, Metro, wherever possible, flattens the grades beyond the criteria requirements. Metro Design Criteria state that the designer should be liberal when establishing length of vertical curve, allowing up to twice the minimum if possible. The absolute minimum length of vertical curve is 200 feet.

What all of these horizontal and vertical design criteria mean is that in going from one point to another, the tracks of Metro horizontally will be tangent or straight sections and easy curves, and that vertically the Metro tracks will gently rise and fall. However, because the operational grade of Metro may not necessarily conform to the shape of the land, various construction sections types will be required to bridge the difference.

CONSTRUCTION SECTION TYPES

Section Types

Along the ARS track alignment, there are three generalized vertical characteristics: subsurface; surface; and aerial. Each of these vertical positions consists of one or more section types, each with differing design geometrics. Subsurface areas are either tunnel sections consisting of two separate circular tunnels, or cut and

cover rectangular sections consisting of a single box containing two tracks or consisting of two separate boxes each with one track. Surface portions of the alignment can be either retained cut sections, at-grade sections, or retained fill sections.

SUBSURFACE OPERATIONS

Earth Tunnel Sections

Earth tunneling is excavation in earth accomplished, for circular sections, by either a mole or a tunnel shield, both of which are types of mechanical tunnel boring apparatus.

Temporary tunnel support will be provided by steel ribs and lagging. Permanent support is provided by the lining, which can be, per engineering specifications, either a reinforced concrete rigid liner or a liner made of fabricated steel and cast iron. Constructed in linear segments, curves are accomplished by connecting a series of straight segments to act as "chords".

The maximum lengths of chord for circular tunnels are:

Radii 2500 feet or greater	50 feet
Radii less than 2500 feet	25 feet

In the design of the tunnel interiors allowances have been calculated so that the dynamic outline of the vehicle (the total space occupied by the vehicle as it slightly bounces or rocks back and forth while in operation) does not hit any obstructions or infringe on the safety walk area.

In addition, circular segmental tunnel liners are designed to resist individual jack thrusts or 125 tons spaces at approximately 2.5 feet on centers.

Other phenomenon such as buckling and the possibility of corrosion have been considered in the circular tunnel segments design.

Upon completion of a segment liner, the space between the liner and the earthen tunnel wall is filled or grouted to prevent settling.

Rock Tunnel Sections

Rock tunneling is done by means of a tunnel boring machine which forms tunnels by boring, grinding, cutting, chipping or otherwise mechanically abrading the rock without the use of explosives; or by detonation of explosives placed in holes drilled in the rock to be excavated.

The entire length of any single track running tunnel may be excavated to either a circular or a horseshoe shape.

Surrounding rock is supported as necessary by means of welded wire mesh fabric and structural steel supports consisting of steel ribs and plates. Steel ribs are either circular or horseshoe shaped depending on the tunnel shape.

Blasting is required to be carried out in such a manner as to assure the stability of remaining rock.

The vertical location of both blasting and drilling activities is based upon a determination of rock type made by means of exploratory borings.

A concrete liner supported by grouted rock bolts may be built into the excavation after its completion.

Cut and Cover Sections

Cut and cover sections are built, as the name implies, by cutting or digging a trench to the proper depth. The section is then constructed, and the trench backfilled. Tunnel sections types associated with cut and cover are either two single rectangular boxes (one track each) or a single rectangular box, known as double box, which contains both tracks. Constructed in linear sections, curves are accomplished by a series of chorded sections.

Allowances have been calculated so that there is a sufficient clearance envelope between the dynamic outline of the vehicle and any obstructions and to insure that the dynamic outline does not intrude into the safety walk. In certain cases, track centers on horizontal curves must be widened geometrically to accommodate the clearance requirements.

Portals

Effecting the transition from subsurface operations to surface operations are tunnel portals. Design characteristics of these features are:

Tunnel and box section entrance portals are required to be designed in a manner to minimize the rate-of-change of pressure on a train passing through the portal.

Exceptions that do not require special transition portals are:

a. Tunnels of a length less than 200 feet.
b. Single track circular tunnels with train velocity 40 mph or lower.

Subway Ventilation

In the early days of subway tunnel construction, little or no attention was given to ventilation. It was not unusual for subway temperatures to rise to 90 degrees and stay there all summer even though the outside temperature would drop at times to 60 or 70 degrees. Not until the late 1930's, when the "new" Chicago subway system was designed, was any rational analysis for the design of subway ventilating systems made before construction.

Subway ventilation systems must circulate fresh air and replace foul air in addition to dissipating heat that is produced by train motors, passengers and lighting. The system has to perform virtually noiselessly and with relatively low-velocity air movement in station areas and at surface openings.

Trains moving in tunnels act as pistons, pushing large volumes of air in front and drawing large volumes of air behind. If fresh air were supplied into a subway tunnel at adequate intervals, a ventilation system as a by-product of train operation would be obtained. However, when such volumes of air are pushed into stations, relatively high velocities can occur on the passenger platforms. To relieve this blast action, vent shafts are provided in tunnels near the station portals.

An emergency that stops the trains also would stop ventilation of tunnels that rely solely on this type of piston action ventilation. Consequently, a mechanical ventilation system has to be provided. The mechanical system must be designed to carry the entire ventilation load in case of train stoppage, draw smoke and fumes away from passenger areas in case of a fire or other emergency, and, if necessary, supplement the piston action even when trains are in operation.

Primary ventilation will be provided by three means:

a. Mechanical
b. Piston-action of trains
c. Natural convection

Sufficient mechanical equipment shall be installed in the primary ventilation system to handle the entire ventilation requirements of the subsurface sections. The piston-action of trains and natural convection are considered as adequate only for periods when low outside temperatures prevail.

Mechanical ventilation shall be accomplished by means of fans in fan shafts exhausting air from the subway. Operation of fans shall be controlled normally by thermostats in tunnels. Fresh air will enter the subway through portals, passageways and vent shafts, replacing the air exhausted. Metro's mechanical ventilation system will be of adequate size to handle total tunnel ventilation load but will operate only when tunnel temperatures exceed 95 degrees. In an emergency, however, the vent shaft louvers can be closed and air from station areas drawn through the tunnels to the fan shafts and exhausted. Smoke or objectionable odors thus will be removed from the public areas. In conditions requiring smoke flow to be in the opposite direction, the fans can be reversed.

Where possible, vent and fan shaft surface openings will be in areas not accessible to the general public. Fan and vent shafts will have ladders or stairways for access, maintenance and emergency use. Where located in sidewalks, vent and fan shafts shall occupy not more than 40% of the sidewalk width. Where possible, they should be located in median strips or off-streed locations and suitably screened with planting or other decorative treatment. Vent shafts shall not be located in roadways, except under special circumstances.

Standby ventilating equipment will not be provided unless special circumstances indicate that it is necessary.

Air Quality Near Fan and Vent Shafts

There will be no noticeable long or short term air quality impacts associated with fan and vent shafts. Electric trains emit no harmful pollutants, nor will heat effluents be significant enough to cause environmental impact. Also, since the air entering and leaving the vents and fan shafts is characteristic of the ground-layer air, tunnel ventilation merely redistributes ambient air and is expected to have no effect on ambient levels of air quality in the immediate vicinity of the shafts.[1]

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[1]Environmental Research and Technology Air Quality Analysis of Metro 'E' Route, November, 1974.

Sound Control for Primary Ventilation System and Running Tunnels

General

Line sections with running tunnels and each fan and vent shaft shall be acoustically treated to (1) reduce the noise and reverberation transmitted from the running tunnel to the passenger stations, (2) reduce noise impinging on the subway cars, thus reducing the noise level inside the cars, and (3) reduce the noise level transmitted to the surface through the fan and vent shafts openings.

SURFACE OPERATIONS

Metro surface operations include retained cut sections, open cut sections, sections at-grade, and retained fill sections. A retained cut section occurs when the Metro alignment is below the surrounding grade; however, the alignment is open to the sky. Typically, a trench is dug and reinforced concrete retaining walls are constructed in the sides of the trench, approximately at a right angle to the bottom of the trench. An open cut also is a trench in which the Metro operates. However, in the case of open cut, the sides of the trench are graded away and seeded. Sections operating at-grade indicate that the Metro alignment is very close to the existing grade of the surface. Along these sections there is no major embanking along the bed of the track. Retained fill sections are the inverse of the retained cut sections. Instead of constructing concrete walls to hold back the sides of the trench, in which Metro operates (retained cut), retained fill sections occur when reinforced concrete walls are constructed and then the area between the walls filled. Metro operations in retained fill sections are above the elevation of the surrounding areas.

Retaining Wall Sections

Because of the similarity of a retained cut and a retained fill, WMATA developed Design Criteria generalized for all retaining wall sections.

Retaining walls are linear structures built of reinforced concrete. The walls are structures which are free to yield to earth pressure. Retaining walls above 20'-0" in height are designed on the basis of specific soils information relating to the backfill material.

Where the alignment curves, walls may be constructed in chords whose length shall be measured along the inside face of the wall nearest the curve center. Maximum lengths of chord are:

Radii 2500 feet or greater	50 feet
Radii less than 2500 feet	25 feet

As in subsurface sections, allowances have been calculated to maintain an adequate clearance envelope around the dynamic outline of the vehicle.

In certain cases, track centers on circular curves must be widened geometrically to provide the 1'-8" minimum space required for installation of light standards. In addition where a closed drainage system is installed between the track and the face of retaining wall, the minimum clearance from and of track wall is 8'-6".

Other Surface Types

Other surface operations adhere to the criteria developed for surface track sections, with additional design considerations expressed for open cut slopes and earth embankments. These criteria determine a clearance envelope around the vehicles dynamic outline sufficient to avoid hitting any obstructions and avoiding the dynamic outline's encroachment into the safety walk space. In certain cases, track centers on circular curves must be widened geometrically to provide the 1'-8" minimum space required for installation of light standards.

Surface sections requiring slopes of cuts and fills shall not be steeper than two horizontal to one vertical unless specifically authorized by the Authority. Shoulders of cut slopes shall be rounded. Slopes shall be protected from surface erosion by a cover of grass or other vegetation suitable for the particular location and soil condition. Slopes steeper than two horizontal to one vertical, where specifically permitted by the Authority, shall be protected in a like manner. Special consideration shall be given to slopes shaded from light and precipitation. Where protection by grass or other vegetation is not feasible, grouted field stone riprap or other approved form of slope protection shall be provided.

Aerial Operations

Essentially an aerial structural is a steel and concrete bridge for the Metro. Because of the nature of aerial structures general and special design criteria were developed.

In addition to the clearance envelope separating the dynamic vehicle outline from any obstructions, the safety walks and light standards have been relocated.

Aerial structures shall have side safety walk projecting generally toward the centerline of construction. Where light standards are required, they shall be located at the back of the safety walk.

Special design criteria, developed for aerial structures take into account specific considerations germane to bridges. These factors include among other things, wind velocities, thermal stress, live load stresses, dead load stresses and the effects of flooding on foundations.

ENGINEERING CONSIDERATIONS RELATED TO ALIGNMENT CONSTRUCTION

Underpinning of Existing Structures

For a variety of soil conditions, geologic conditions or hydrological conditions, certain types of Metro construction (usually earth tunnel, cut and cover, retained wall and open cut) could weaken the foundations of buildings not acquired by WMATA. Certain buildings which cannot be acquired and demolished, remain adjacent or above the Metro alignment. The foundations of these buildings could be weakened. Therefore, Metro Design Criteria are to define when underpinning is necessary.

All designs for support and underpinning of existing structures are coordinated with the General Engineering Consultant and the General Soils Consultant. The economics and feasibility of various underpinning and dewatering methods for structures influenced by excavation or tunneling shall be investigated by the Section Designer and recommendations shall be made as to the method best suited to the particular structure.

 NEW

Special provisions shall be made in the contract plans and specifications requiring the construction contractor to maintain, protect and be responsible for the safety, stability and integrity of all buildings and structures which may be affected by his work.

All structures shall fall into one of the following categories:

Category 1 Structures

Category 1 structures are those structures for which the required underpinning designs, detailed drawings and specifications are prepared by the Section Designer.

This category includes buildings or structures which extend over the transit structures to such an extent that they must be temporarily supported during construction and permanently underpinned.

Buildings or structures immediately adjacent to the transit structures, which must be carried on underpinning braced to act as retaining elements supporting the sides of the excavation.

Any other buildings or structures for which it is agreed by the Authority, the GSC and the GEC that it is inappropriate for the construction contractor to prepare the designs.

Underpinning walls or piers supporting buildings or structures and forming a portion of the excavation support system shall be extended to a minimum depth of 4'-0" below subgrade elevation of the underground rapid transit structure.

Methods used to underpin or protect these buildings or structures shall depend on local soil conditions. The general type of underpinning techniques used is the pier, pile or caisson method. If conditions permit Metro might protect some structures by constructing a retaining wall between the foundation and the excavation, or Metro might inject the soil under the buildings with freezing and chemical injections rather than underpin the structures.

Category 2 Structures

Metro defines category 2 buildings as all potentially affected buildings or structures not in category 1.

Category 2 also includes structures which may be affected by groundwater lowering. In certain areas uncontrolled lowering of the groundwater for rapid transit construction may cause settlements of buildings both adjacent to and some distance away from the cut and cover or tunneled excavation. Protection of these structures will be the contractor's responsibility.

All underground construction shall be designed on the assumption that the category 2 structures will not be underpinned. This will provide additional safety if they are underpinned, and eliminate any question of redesign if not underpinned.

Temporary Street Decking

Because of Metro construction excavations, particularly for cut and cover sections and the necessity of utilizing the surface over these trenches, primarily for roadways, temporary street decking is installed.

Temporary decking systems, including decking, beams, piles, lagging, bracing, struts, railings, curbs, sidewalks, and other elements shall be designed by the contractor in accordance with the requirements established by the section designer.

WMATA also provides for all necessary arrangements with public authorities so that construction access ramps and other construction facilities which affect the temporary decking systems do not unnecessarily create traffic congestion.

Restoration of Utilities During and After Construction

During the course of Metro construction, utilities, such as sewer lines, water lines, etc., will be encountered. Metro has developed Design Criteria to govern the maintenance, support, restoration and construction of utilities encountered or affected by construction of the rail transit system, and the restoration of pavement disturbed by such construction. In the performance of work, due consideration shall be given to the needs of the transit system, the requirements and obligations of the utility organizations, traffic requirements, the service needs of abutting properties and policies established, or to be established, by WMATA.

1. Utilities include facilities belonging to governmental agencies, public utility corporations and private parties, including service lines to adjoining properties.

2. Utilities encountered or close enough to be affected by transit construction shall be:

a. Supported and maintained complete in place during construction and continued in service following completion or transit facilities;

b. Temporarily relocated and maintained, then, upon completion of transit facilities, restored to service; or

c. Temporarily relocated and maintained, then, upon completion of transit facilities, replaced by a new utility; or

d. Permanently relocated to a new location beyond the immediate limits of transit construction.

Utility service to abutting property shall not be interrupted and, if temporarily relocated, shall be restored upon completion of work.

Replacements for any existing utilities, including governmental facilities and pavements shall be designed to provide service essentially equal to that offered by the existing installations.

Track Work, Power Systems and the Metro Car

Running Rails

The steel rails on which the cars will operate are called the running rails. Welded together to form continuous lengths, these lengths have insulated joints at interlocking locations.

In all underground sections and in aerial section without ballast, or crushed stone trackbeds, the running rails are fastened directly to the concrete trackbed which is installed on top of elastomer pads. In ballasted sections of track, the rails are mounted on ties of either wood or concrete. For crossovers and turnouts, as well as

other sections of special trackwork, the rails are installed on special steel base plates which in turn are mounted on elastomer pads.

At the ends of the tracks, bumping posts are installed to prevent cars from rolling off the ends of the tracks. Derails, which are special track features that allow cars to be removed from the track, are installed at yards and storage areas.

Traction Power System

Metro cars are driven by on-board electric motors. Power for Metro is supplied by either the Potomac Electric Power Company, utilizing duplicate 13.8 KV, 3 phase, 60 hertz power circuits, or by Virginia Electric and Power Company, utilizing 34.5 KV, 3 phase, 60 hertz power circuits. These utility primary services are supplied to Metro substations.

Equipped with at least two complete transformer rectifier units, the energy is transformed from alternating current to direct current with a voltage output of 700 volts when operating at 100% load. The spacing and capacity of these substations are based on power supply demanded by the system operating at maximum. Metro has established that the optimum substation spacing is 5700 feet apart for downtown areas and 6500 feet apart for suburban areas. In general, there are three substation types, each with different ventilation requirements. Two types of substation are located above ground, one with the transformers outside a building while the other type locates the transformers inside a building. The third type of substation is one located underground.

The direct current from the substations is conducted using cables to a third rail located on the trackbed called the Contact Rail.

Made of special alloy steel, the contact rail is installed parallel to the running rails, and carries the electricity for the cars. Circuit breakers are installed on the contact rail between substations allowing Metro to isolate power throughout the system.

The electricity carried by the contact rail is supplied to the Metro cars by means of collector shoes which are attached to each Metro car and that maintain contact with the contact rail. The running rails complete the electrical circuit by serving as negative electrical conductors returning the power to the substations.

The Vehicle

The general design criteria determining alignment geometrics, the types of constructions which were designed to conform with the alignment geometrics, the power supply, rails, railbeds, and stations all were designed so that a rail vehicle could efficiently and safely move people from place to place. Metro has chosen a car intended to maximize all the previous design considerations.

Metro cars are high performance, lightweight electrified vehicles and are faced with sculptured polished aluminum. In addition to large windows in the front of the car, tinted panoramic side windows are provided. Overall the cars are 75 feet long, 10 feet wide and have seats for 81 passengers as well as standing space for an additional 94 people. Three sets of side doors open along the length of the vehicle allowing passengers to enter or leave the car. The interior of the car, which is air conditioned, is carpeted and seats are padded.

The cars are suspended using baloon-like bags, called air springs, which vary the air pressure in the bags according to the weight of the load.

The vehicle's maximum speed is 75 miles per hour.

By 1980, there will be 476 cars in the system and by 1990, there will be 576 cars in the system.

AUTOMATIC TRAIN CONTROL

The train control system shall automatically control the movement of trains. Design of the train control system must be coordinated with the design of car equipment, electrification, and communications.

In general terms the Automatic Train Control can be described best when viewed in terms of its parts or subsystems.

The first subsystem is the Automatic Supervision (ATS), which is a computer program. ATS is programmed to "operate" the trains to a fixed predetermined schedule. For example should a train leave a station slightly late, ATS would order an increase of speed, regardless of the affects of this increased speed. Therefore, another subsystem is needed to monitor ATS commands.

The Automatic Train Protection (ATP) subsystem consists of a series of wayside monitors and detectors which feed information to the ATP control rooms located at each station, in fact monitoring what is actually happening on the tracks. ATP is designed to override commands from ATS. Therefore, continuing the example, should ATS have "ordered" the train to increase speed in excess of the design velocity of a particular section of track, ATP will countermand this order imposing the correct safe operating speed.

Correct orders from ATS and the corrected orders from ATP are transmitted to the Automatic Train Operation System (ATO), which acts as an autopilot aboard the trains. It is important to observe that ATS and ATP operate simultaneously and independently of one another.

The interactions of these subsystems are monitored at the Metro Control Center. Normally, the train control system will operate automatically without human intervention to perform functions of the system in accordance with one of several prescheduled programs. In the event of an ATS failure on all or a portion of the transit system which precludes direction from Central Control, the affected portion of the system shall continue to operate under the direction of local controls.

The system allows for manual operation of trains during periods of emergency or in the event ATC may be ineffective.

Each train will have an attendant on board whose principal duties are to oversee safety and to perform emergency operations. This attendant shall be provided with radio communications to contact the Train Control Supervisor at Central Control.

Manual operation shall be subject to control of ATP. With manual operation in effect, the train will be operated in accordance with visual speed indications in the Train Attendant's compartment subject to overspeed control. Failure of the attendant to keep train speed below the level indicated by the cab signal aspect, will result in a closed-loop brake application until the train speed is brought below that authorized by ATP.

If the ATP and ATO subsystems are both ineffective, the Train Attendant shall operate the train at a speed not in excess of 15 mph, under direction of the Train Control Supervisor. Procedures for manual operation of the train will

be described in the Operating Department's Book of Rules. Under these conditions, the car traction control system shall limit the tractive effort to preclude higher speed without a command from ATP. Change-over from the automatic mode to manual mode shall be possible only when the train is stopped, the braking system is set at maximum effort and zero speed is indicated by ATP.

Should an operating discrepancy occur, the ATS automatically notifies Central Control. For a late leaving train because of train speed reduced by the ATP overriding the ATS, the effect is an increasingly delayed train. To correct this delay safely, Central ATS will display discrepancies in system performance and the routine automatic control adjustments which are being undertaken to correct them. These data will be displayed on the Train Control Supervisor's console.

If ATS determines that a strategy requiring authorization from the Train Control Supervisor should be applied, the supervisor will be alerted so that he may request a display of data stored in the computer by means of the data display keyboard. These data shall include corrective strategies with their predicted consequences. The corrective strategy will then be initiated by the Train Control Supervisor as he elects.

METRO OPERATION

Train Consist

Trains operating on main tracks will consist of not less than two nor more than eight cars. Cars shall be designed as married pairs with control and monitor positions on opposite ends of the pair. Automatic Train Control equipment shall be common to each pair of cars.

Speed Limits

a. Normal Operation

The maximum authorized speed on the system will be 75 mph. In certain sections, trains will operate at reduced speeds due to alignment or operating restrictions.

b. Abnormal Operations

Certain track maintenance work will require restricted speeds through a work area. For this

purpose, the train control system will enforce a reduced speed limit in a temporary area defined by the work limits.

Headway

Design shall permit trains to operate on a sustained 90-second headway. Provision shall be incorporated in the design to permit following trains to close-in to a nominal 300 foot interval between trains in all station areas. Where the normally assigned station dwell time exceeds 15 seconds, it will be necessary to provide additional station closing in facilities.

Station Stops

Station platforms will be 600 feet long. Trains will stop at passenger stations with the head end of the train within plus or minus five feet of predetermined positions on the station platforms.

Station Dwell Time

The normally assigned station dwell time, system-wide, will be 15 seconds. Individual stations may be assigned dwell times in excess of 15 seconds. The dwell time shall be controlled by local programming units, which will be adjustable in five second increments within limits of 10 and 60 seconds.

The local programming units shall be synchronized with the automatic central supervisory computer and will be subject to requests from Central Control which may override local control to select any increment of time adjustment available.

Reverse Running

Reverse running will be allowed on all sections of the train tracks. Trains running against flow of traffic will operate automatically at the ATC speed limits for the normal direction of traffic on that track where economically practical.

GENERAL METRO SYSTEMS

In addition to the engineering criteria for the section types and the specific requirements governing construction related issues, system-wide standards include the lighting systems; drainage standards; control of access standards; clearance; and emergency provisions.

Lighting Systems

WMATA provides lighting systems for:

1. Passenger stations, including entrances, escalators and passageways, exterior areas, parking facilities, ramps, walkways, and bus loads;

2. shafts and tunnels;

3. traction power stations and the breaker stations;

4. ancillary spaces; and

5. car storage yards.

The minimum maintained lighting levels for these various areas are:

AREA	LEVEL OF ILLUMINATION (Footcandles)	FIXTURES
1. Subway Tunnel Structures	1.5	Fluorescent
2. Special Trackwork Areas	3.0	Fluorescent
3. Subway Emergency Lighting	0.25	Fluorescent
4. Traction Power Substations and Tie Breaker Rooms	15.0	Fluorescent
5. Car Storage Yards	1.0	Mercury Vapor
6. Bus Loops	(1)	
7. Parking Areas	(1)	
8. Bus Platforms	(1)	
9. Fan and Vent Shafts		Incandescent
10. Escalator Entrances	(1)	

[1]Luminares are required to be so selected, located and aimed that while accomplishing their primary purpose they will produce a minimum of objectional glare and interference with vehicular traffic and neighboring surroundings.

Drainage

Surface drainage is designed to be largely drained by gravity and alignment sections are constructed on grades to accomplish this. Drainage pumps are located in areas not drained by gravity. In track sections, manholes or drainage slot inlets shall be provided at maximum 350 foot centers.

In subway sections, Metro uses drainage piping made of either cast iron or asbestos cement. Where pumps discharge into sewers, the discharge head is increased to exceed the overcharge rate of the sewer.

Control of Access

Metro has adopted a policy of preventing public vehicular or pedestrian traffic from entering the right-of-way except in station areas. In addition to crossing all rights-of-way grade separated from the roads, WMATA is building appropriate barriers to prevent the public from gaining access to the tracks.

Acceptable forms of pedestrian barriers include fences, walls, and structural elevation differences. A deterrent in the form of barbed wire or equal physical obstruction must be mounted on the top of the barrier.

Where the transit right-of-way is crossed by a pedestrian walkway, the barrier on the walkway should effectively prevent objects being dropped on the transit right-of-way.

Vehicular Barriers

Acceptable vehicular barriers include highway guard rails, barrier curbs, structural walls or earth embankments. In each case, where vehicular access to areas adjacent to the transit right-of-way is possible, individual circumstances must be evaluated including the possibility of accidental entry by runaway vehicles.

Service Roads

Because of the separation of the alignment, service roads must be provided. Constructed at grade on exclusive rights-of-way, service roads need not be continuous although this is desirable. If the road is not continuous, a means of access shall be provided for each section of road.

Security

An electrically supervised, selective coded, closed circuit burglar alarm system is to be provided to serve the System. Automatic devices, tape and switches shall be provided on doors, windows, louvers and other points as required in substations, train control and communications buildings requiring protection against unauthorized entry. Audible and visual alarms and indications are required to be provided at local points as necessary and at Central Control. Automatic recording of a burglar alarm indication including a permanent record of date, time and location shall be provided at Central Control.

In addition, station and substations and other areas will be monitored by TV cameras viewed from Central Control.

Security measures for station parking lots are under study and will be developed.

Emergency Provisions

To ensure the safety of Metro passengers, in the event of calamity, all Metro alignments are equipped with emergency systems.

Emergency Power and Lighting

Should there be a power failure, Metro is equipped with emergency lighting and rechargeable emergency batteries for all stations and tunnel sections. The batteries are designed to provide power for the full emergency lighting load for a continuous period of three hours. Emergency lighting is provided by supplying battery power to a portion of the regular light fixtures.

Emergency Guard Rails and Restraining Rails

Guard rails are installed on all aerial structures where the tracks are installed on the concrete trackbed (direct fixation). On single track structures, a guard rail is installed on the inside of each running rail. The guard rail is anchored at least every ten feet on direct fixation tract section and to every second rail tie in all other sections. Fabricated from

structural steel angle, the guard rails are designed to prevent Metro cars from leaving the tracks.

Sharp curves are equipped with restraining rails, to reduce the rail wave and to provide guidance for the train.

Safety Railings

Where elevation differences alone constitute a sufficient pedestrian or vehicular barrier, safety railings are provided for the protection of the public and Metro employees.

Emergency Telephone System

At emergency stations and other places along the track, a partyline, common battery, emergency telephone system is provided. This system is connected to Metro Central Control.

Fire Protection System

Metro is provided with a closed circuit, electrically supervised proprietary, protective, signalling system. Ionization and temperature sensors are provided at all passengers stations, substations, public buildings, yards, shops, and elsewhere along the system where they will be readily accessible. Metro is also equipped with automatic fire detection equipment.

Should a fire start, audible and visual alarms are provided in station kiosks and at Central Control. The fire system also provides for the automatic shutdown of all conditioning systems. Fire fighting equipment is located in all stations.

Emergency Access Shafts

Emergency access or egress from subsurface operation sections can be accomplished using the tunnel safety walk to get to either stations or to get to access shafts. The Metro Design Criteria states that in general access is to be provided to the subway at maximum 2500 foot centers, so that no point in the subway system shall be over 1250 feet from a point of access or egress.

Where station entrances are over 2500 feet apart, emergency access shafts will be provided. These shafts may be combined with fan or vent shafts.

For single entrance stations the vent shaft at the end of the station farthest from platform escalator landings will contain an emergency access stairway.

Hatches on access shafts will be readily unlatched from the inside of the subway and opened by means of 5/16 square rod from outside the subway.

Continuous handrails will be provided in access shaft passageways as well as on stairways. Where doors are required, they shall open in the exit direction. Where locks are required, they shall be provided with panic hardware.

Safety Walkways

Safety walkways are designed as part of the structure for all subsurface section types and for all aerial section types. A minimum width of two feet calculated on the dynamic outline of the train vehicles, is allowed for all safety walkways. Surface operation sections are not provided with safety walks on the assumption that people can readily walk away from the vehicle should the occasion arise.

RIGHTS OF WAY

The Authority will acquire sufficient real property interests to satisfy physical requirements and to assure sufficient control, with due consideration to planning, architecture and operational factors. Fee title to properties will be acquired for stations, station entrances, permanent parking facilities, and other facilities where substantial permanent improvemnts are to be constructed; a lesser interest may be acquired if a single ownership is involved and adequate control can be assured. Areas that must be acquired are identified on right-of-way drawings. The right-of-way, or taking envelope, is influenced by the topography, drainage, ditches, retaining walls, service roads, utilities, side slopes, as well as by the nature of the Metro structures and the construction types used to build these structures.

Because of the geometry of the alignment and the variety of structures to be built, various types of easements are used by Metro. Because all Metro structures are not contiguous, all right-of-way is not necessarily continuous. Isolated rights-of-way are sometimes purchased to accommodate substations, and chiller plants. Rights-of-way for Metro are obtained both from private interests and the public sector. Examples of public areas or spaces would be parkland and streets.

WMATA has adopted a policy of attempting to reduce property takings by reducing or increasing the distance between the tracks and by stepping the right-of-way limits around properties where such procedures will not adversely affect the composite requirements of the Metro system.

Generally easements are either temporary for construction, or permanent. The types of permanent easements used by Metro are:

Permanent Surface Easement

A permanent surface easement, rather than fee title, may be acquired if it provides sufficient space for the construction, operation, protection and maintenance of the Metro facility at ground surface. The recommended easement width must incorporate basic track width, drainage, supporting slopes, utilities and the overall effect on the affected property.

Permanent Surface Easement with an Upper Limit

A permanent surface easement with an upper limit provides space for the transit structures and for the future maintenance of all Metro structures which support portions of the Metro facility located on private property. This easement is also applicable where structures such as a railroad pass over Metro facilities. The easement shall have definite upper and lateral limits which are described by the section designer.

Permanent Underground Easement

A permanent underground easement shall encompass the total Metro facility located beneath the surface of the ground. It shall have definite upper and side limits which shall be described by the section designer. Lower limits shall be described only where special limiting features exist or where required by local regulations.

Permanent Aerial Easement

A permanent aerial easement completely envelops the aerial portion of the Metro facility and provides support rights for aerial structure. Its upper, lower and side limits shall be described by the section designer in reference to the aerial structure.

Utility Easement

A utility easement provides space for the relocation of existing utilities or the installation and maintenance of required utilities.

Occasionally, Metro may require space in an existing building to locate a portion of the system, such as a station entrance. In this case Metro acquires a multi-level easement for the space required in the building.

In establishing the size of the right-of-way, as previously mentioned, the type of structure and the type of construction, among other factors, affects the amount of land required. Metro has developed generalized guidelines establishing the size of right-of-way by constructed section types.

Earth Tunnel

Upper Limit: The limit of the right-of-way is described by elevations of horizontal planes, stepped as required to make the steps coincide with existing property lines or prominent suitable topographical features. As a guide, a horizontal plane twenty-five feet (25') above the top of the running rail shall be used.

Lateral Limit: Fifteen feet (15') from the centerline of the nearest track.

Lower Limit: Where required by local jurisidctions or conditions, a lower limit shall be configured in a manner similar to the upper limit using a distance of fifteen feet (15') below the top of the running rail.

Cut and Cover

Upper Limit: Twenty-five feet (25') above the top of the running rail for single track, double track or triple track, and forty feet (40') at stations. The limit is delineated by elevations of horizontal planes, stepped as required, collating the steps with existing property lines or prominent suitable topographical features.

Lateral Limit: Fifteen feet (15') from the centerline of the nearest track. In station areas, forty feet (40') from the centerline of the stations.

Lower Limit: Where required by local jurisdiction or conditions, the lower limit shall be configured in a manner similar to the upper limit using a distance of fifteen feet (15') below the top of the running rail and twenty feet (20') at stations.

At-Grade

Upper Limit: Normally, an upper limit is not required. When an upper limit is required, the limit shall be described by the elevation of horizontal planes, stepped as required, to coincide with existing property lines or prominent suitable topographical features. The minimum distance from the top of the running rail to the horizontal plane is eighteen feet (18;).

Lateral Limits: The section designer shall establish the right-of-way limits taking into account all requirements that apply to the alignment. The following distances shall be used as a guide:

a. Normal at-grade section - five feet (5') from the toe or top of slope.

b. Normal at-grade section with drainage interceptor ditches - ten feet (10') minimum from the inside edge of the interceptor ditch.

c. Restrictive and retained section - as approved.

Lower Limit: When required the lower limit shall be defined in a manner similar to the upper limit, using a minimum distance of ten feet (10') below top of rail where possible.

Aerial

Upper Limit: The limit is delineated by elevations of horizontal planes, stepped as required, so that the steps coincide with existing property lines or prominent suitable topographical features. The minimum distance from the top of the running rail to the horizontal plane is eighteen feet (18').

Lateral Limit: Single track minimum - fifty feet (50') total; double track on fourteen feet (14') centers, sixty-four feet (64'). A lateral distance of twenty-five feet (25') from the centerline of each track is maintained on wider track centers.

Lower Limit: A lower limit will normally be required. The limit will vary 1' to 4' below the bottom of the structure.

Upper limits are sometimes the function of clearances necessary for the rapid transit structure to "clear" a highway or road. Minimum vertical clearance requirements range from 14'-6" to 16'-4". Besides the types of sections utilized, easements are also required for various structures.

Storm Drainage - Right-of-Way Requirements

a. Open Ditches

A minimum strip ten feet wide is required for ditches where the design requires surface drainage. A two foot clean out shelf is required where the ditch is unpaved. Where applicable, local requirements shall be adhered to.

Back and Front Slopes: In soils, a maximum back or front slope of 2:1 shall be used. Where soil conditions would require excessive slope maintenance of a 2:1 slope, a suitable flatter slope shall be used.

b. Underground Drainage

Widths of public easements for underground drainage systems shall be approved by the local agency involved.

Substations - Right-of-Way Requirements

Substations at grade require a minimum fifteen foot paved access road with a twenty foot long parking area with a turnaround. The requirement for land varies with the type of substation. It should be contiguous to the limit of right-of-way for the Metro, where possible, with five feet maintained between the limit of right-of-way and the face of the structure for maintenance.

Underground substations require ten feet from the outside face of the structure. Provisions shall be made for the cable ducts between the substation and the tracks.

Tie Breaker Stations - Right-of-Way Requirements

Tie Breaker Stations at grade require a minimum of five feet between the structure and the right-of-way limits. A minimum access road of fifteen paved feet with a minimum twenty foot long parking area shall be provided. Provisions shall be made for the cable ducts between the tie breaker station and the tracks.

Vent and Fan Shafts - Right-of-Way Requirements

Vent and fan shafts shall be located in public space where possible. The gratings shall not exceed forty percent of the sidewalk width. When located on private property, the limit of right-of-way shall be five feet from the outside face of the structure. Access to the shaft is required.

Chiller Plants - Right-of-Way Requirements

As a guide, chiller plants at grade require five feet from the face of the structure to the limit of the right-of-way. Suitable access is required.

Chiller plants require additional space for the cooling tower when the cooling tower is located beside the mechanical plant instead of on top of the plant room. When chiller plants are located on existing buildings, a pipe and conduit chase shall be provided and required easements delineated on the right-of-way plans.

Utility Easements

Utility easements required shall be treated as right-of-way. Bearings and distances along the centerline shall be shown as will the lengths and widths of the easements, and ties to the limits of right-of-way. All easements and clearances shall be in accordance with the Federal, State, local, and utility regulations and policies.

Paralleling or Sharing Highway Links

No standard policy has been established by WMATA regarding design, construction, or operation which would apply in general where Metro segments parallel or share highway links since decisions pertaining to these situations are made tailored to meet specific conditions and problems as such are encountered. Coordination between WMATA and the highway departments exists in general but WMATA coordinates specifically with individual highway departments whenever highway rights-of-way are involved.

Safety During Construction and Operation of Metro

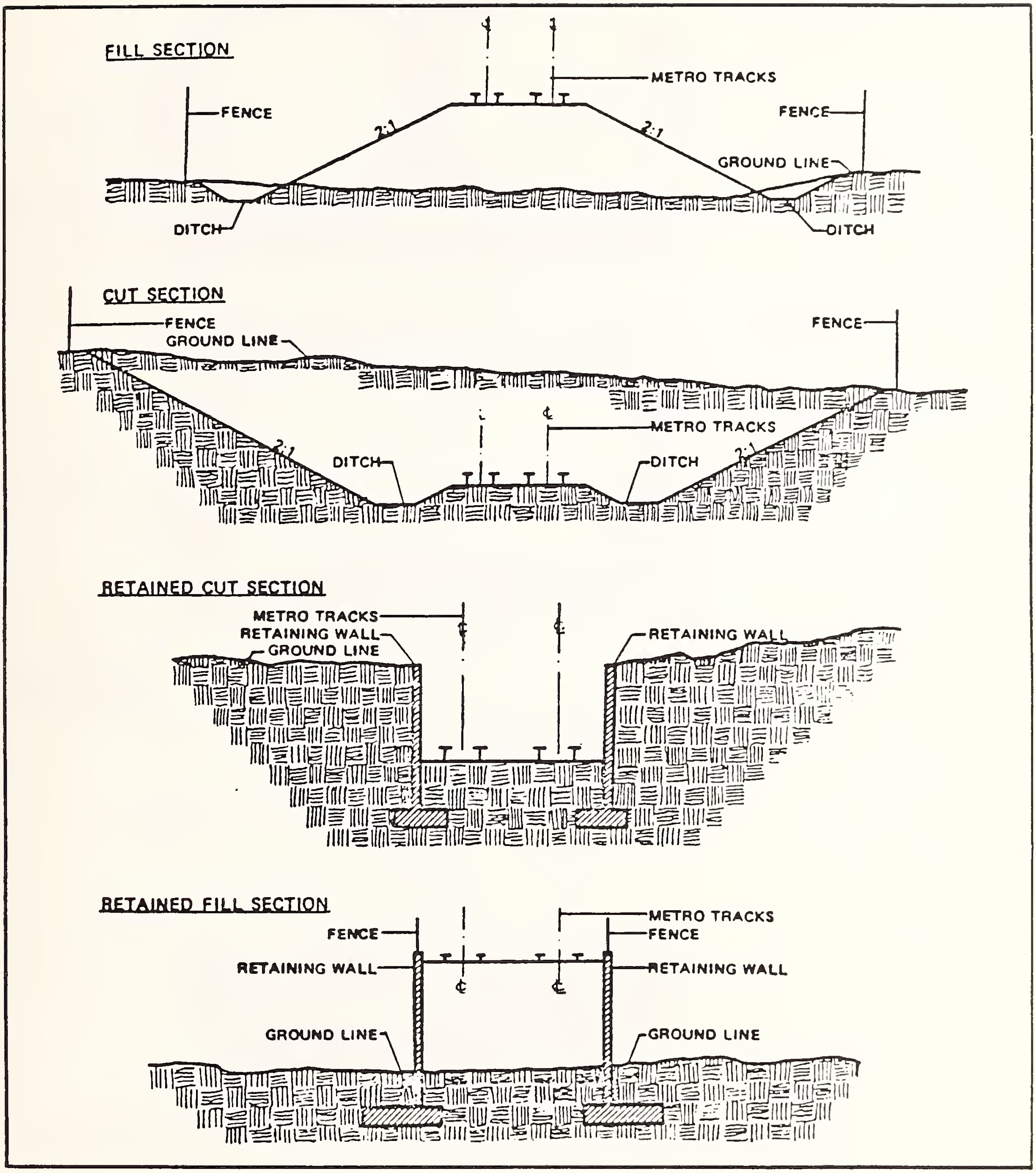
The prevention of accidents in the course of completing the Metro System is of primary importance to everyone connected with WMATA. A safety program has been established and adopted by WMATA to coordinate all available means of eliminating or controlling hazards and risks associated with the ompletion of the Rapid Rail Transit System.

Every contractor employed by WMATA bust be familiar with the Federal Occupational Safety and Health Act (OSHA) as it pertains to his work responsibility, and must implement it as federal law requires. In addition, contruction contracts require compliance with safety standards established by local jurisdictional authorities where those requirements are more stringent than those established by OSHA.

To insure maximum compliance on safety matters WMATA and its consultants have established a Coordinated Safety Program and Reporting Procedure.

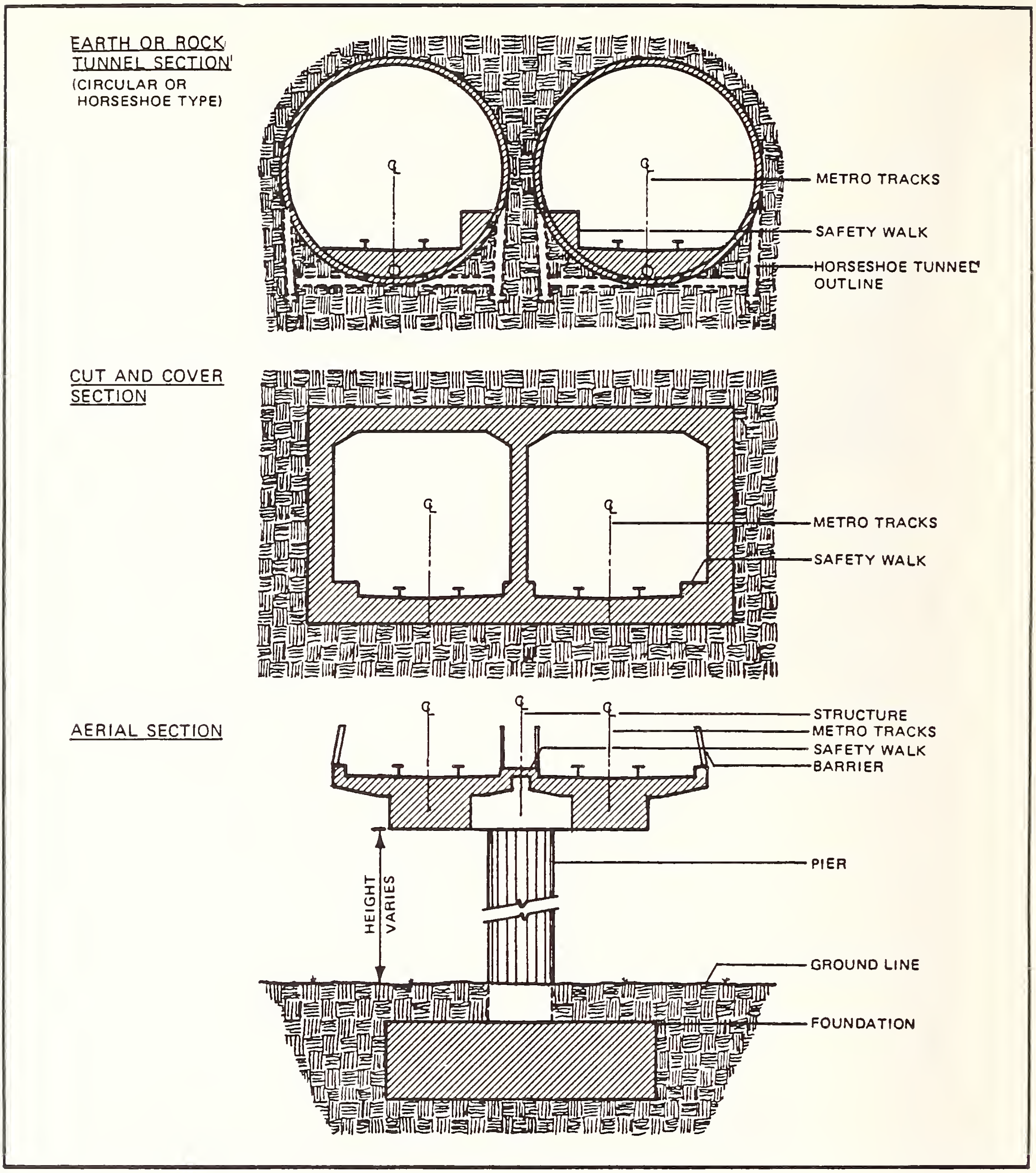
In conjuntion with the above, the Systems Group of DeLeuw, Cather is establishing rules and regulations for operational safety that shall be the standard operational procedures to which WMATA employees will adhere. These procedures will be established before the first train rolls.

Additional details of the WMATA safety and security program are set out in Appendix D, Metro Systems Characteristics in Part 3 of this report.


FILL SECTION
METRO TRACKS
FENCE
2:1
2:1
FENCE
GROUND LINE
DITCH
DITCH
CUT SECTION
FENCE
GROUND LINE
FENCE
METRO TRACKS
2:1
DITCH
DITCH
2:1
RETAINED CUT SECTION
METRO TRACKS
RETAINING WALL
GROUND LINE
RETAINING WALL
RETAINED FILL SECTION
METRO TRACKS
FENCE
FENCE
RETAINING WALL
RETAINING WALL
GROUND LINE
GROUND LINE

NEW

metro


EARTH OR ROCK TUNNEL SECTION
(CIRCULAR OR HORSESHOE TYPE)
METRO TRACKS
SAFETY WALK
HORSESHOE TUNNEL OUTLINE
CUT AND COVER SECTION
METRO TRACKS
SAFETY WALK
AERIAL SECTION
STRUCTURE
METRO TRACKS
SAFETY WALK
BARRIER
PIER
HEIGHT VARIES
GROUND LINE
FOUNDATION

NEW

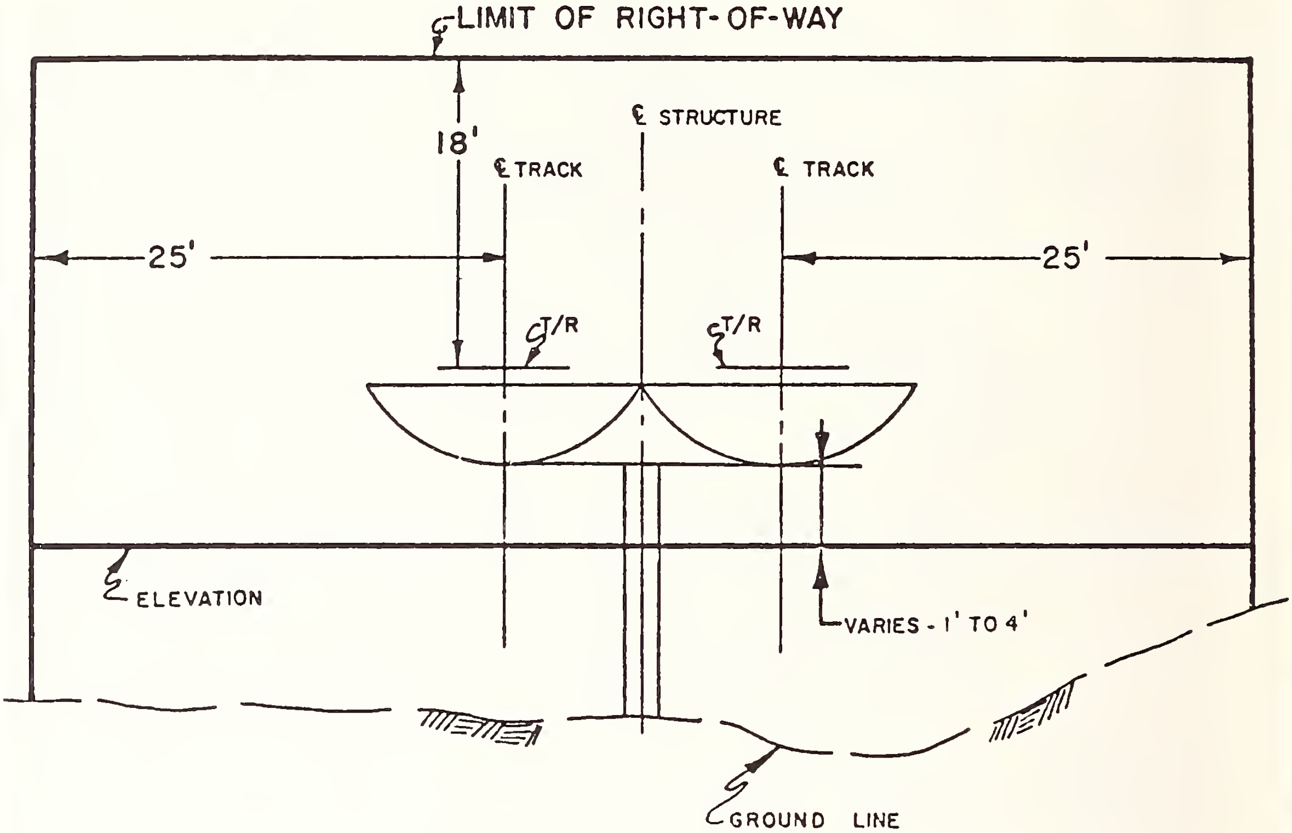
TYPE CONSTRUCTION	AT GRADE		CUT AND COVER	EARTH TUNNEL	ROCK TUNNEL	AERIAL
TYPE EASEMENT (PERMANENT)	SURFACE	SURFACE WITH UPPER LIMIT	UNDERGROUND	UNDERGROUND	UNDERGROUND	AERIAL
UPPER LIMIT	N/A	18' ABOVE T/R 13' ABOVE T/R UNDER BRIDGES	SINGLE TRACK-25' ABOVE T/R DBL. OR TRPL -25' ABOVE T/R STATIONS - 40' ABOVE T/R	1 SINGLE TRACK 25' ABOVE T/R 2 DOUBLE TRACK 25' ABOVE T/R	1 SINGLE TRACK 35' ABOVE T/R 2 DBLE TRACK 40' ABOVE T/R 3 AT STATIONS 70' ABOVE T/R	18' ABOVE T/R
LOWER LIMIT (WHERE REQUIRED BY JURISDICTIONS)	15' BELOW T/R		15' BELOW T/R STATIONS-20' BELOW T/R	15' BELOW T/R	14' BELOW T/R	VARIES 1' - 4' BELOW BOTTOM OF STRUCTURE
LATERAL LIMITS	EXCLUSIVE ROW VARIES (SEE DIRECTIVE DRAWINGS) RESTRICTIVE ROW AS APPROVED (SEE DIRECTIVE DRAWINGS)		15' FROM ℄ NEAREST TRACK 40' FROM ℄ OF STATIONS	15' FROM ℄ NEAREST TRACK	30' FROM ℄ NEAREST TRACK 60' FROM ℄ STATIONS	SINGLE TRACK 50' DOUBLE TRACK 25' FROM ℄ EACH TRACK

NOTES:

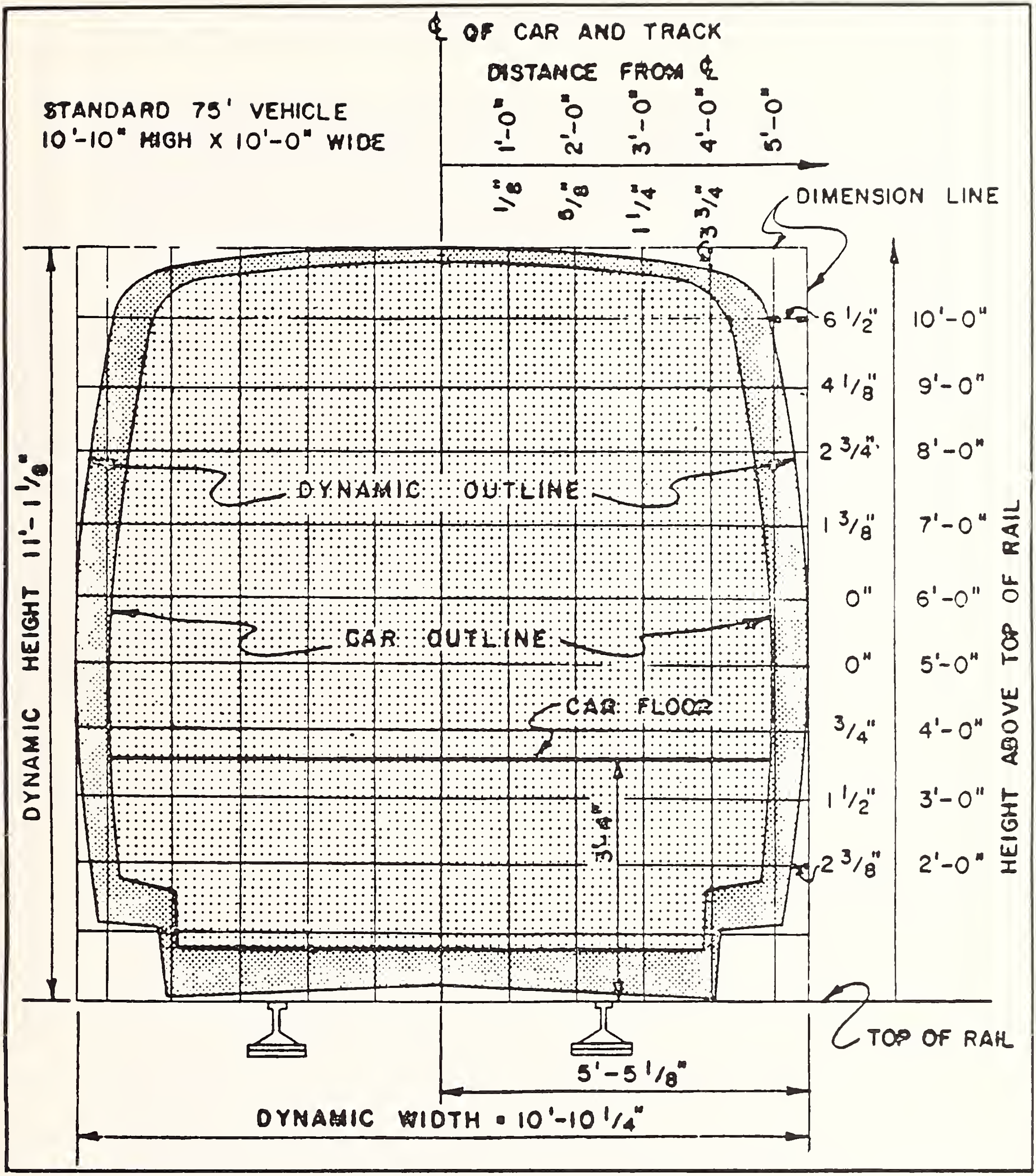
1 DISTANCES SHOWN ARE MINIMUM, AND ARE TO BE INCREASED WHERE ENGINEERING REQUIREMENTS SUCH AS ROCK BOLTS, SERVICE ROADS, OR DRAINAGE DICTATE ADDITIONAL NEEDS.

2. ALL LIMITS OF RIGHT-OF-WAY ARE TO BE VERTICAL OR HORIZONTAL PLANES.

3 IN SUBWAY, WHERE THE DISTANCE SPECIFIED FOR THE UPPER LIMIT EXTENDS ABOVE THE GROUND SURFACE, USE THE GROUND SURFACE AS THE UPPER LIMIT.


LIMIT OF RIGHT-OF-WAY
18'
℄ STRUCTURE
℄ TRACK
℄ TRACK
25'
25'
T/R
T/R
ELEVATION
VARIES - 1' TO 4'
GROUND LINE

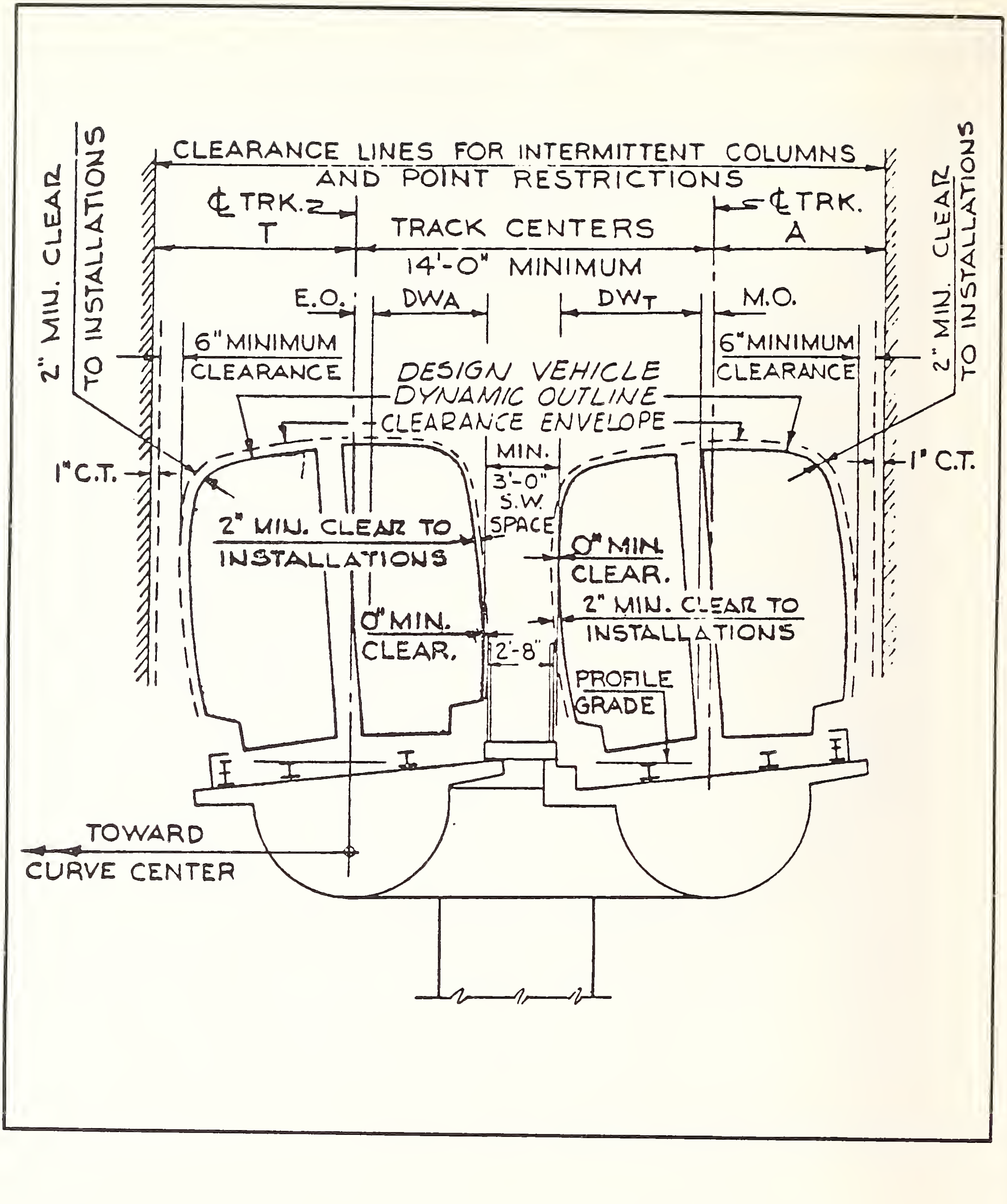
NEW



℄ OF CAR AND TRACK
DISTANCE FROM ℄
STANDARD 75' VEHICLE
10'-10" HIGH X 10'-0" WIDE
1'-0"
2'-0"
3'-0"
4'-0"
5'-0"
1/8"
5/8"
1 1/4"
3 3/4"
DIMENSION LINE
6 1/2"
4 1/8"
2 3/4"
1 3/8"
0"
0"
3/4"
1 1/2"
2 3/8"
10'-0"
9'-0"
8'-0"
7'-0"
6'-0"
5'-0"
4'-0"
3'-0"
2'-0"
HEIGHT ABOVE TOP OF RAIL
DYNAMIC HEIGHT 11'-1 1/8"
DYNAMIC OUTLINE
CAR OUTLINE
CAR FLOOR
3'-4"
TOP OF RAIL
5'-5 1/8"
DYNAMIC WIDTH = 10'-10 1/4"

NEW

metro


CLEARANCE LINES FOR INTERMITTENT COLUMNS AND POINT RESTRICTIONS
℄ TRK. T
TRACK CENTERS
℄ TRK. A
14'-0" MINIMUM
E.O.
DWA
DWT
M.O.
6" MINIMUM CLEARANCE
6" MINIMUM CLEARANCE
2" MIN. CLEAR TO INSTALLATIONS
2" MIN. CLEAR TO INSTALLATIONS
DESIGN VEHICLE
DYNAMIC OUTLINE
CLEARANCE ENVELOPE
MIN. 3'-0" S.W. SPACE
1" C.T.
1" C.T.
2" MIN. CLEAR TO INSTALLATIONS
0" MIN. CLEAR.
2" MIN. CLEAR TO INSTALLATIONS
0" MIN. CLEAR.
2'-8"
PROFILE GRADE
TOWARD CURVE CENTER

NEW

metro

SECTION 2: THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

Environmental impacts are discussed in four groupings: Natural and Ecological Impacts; Visual and Physical Impacts; Social and Economic Impacts; and Impacts on Parkland, Historic and Archeological Sites. Impacts vary in character and magnitude locally, but regional implications are assumed to be the major concern of this section. Local impacts are included in the route summaries at the conclusion of this volume.

NATURAL AND ECOLOGICAL IMPACTS

The major regional ecological impacts of the Metro system are largely independent of specific locations or route alignments, deriving instead from the creation of the regional mass transit system. One significant factor, that of spoils disposal, is the result of the construction of extensive subsurface portions of the Metro system. Erosion, sedimentation and hydrologic effects are of concern both during construction and operation of Metro. One of the more important positive impacts attributable to Metro is the reduction in automobile traffic and congestion and its concomitant expected decrease in air, water and noise pollution.

Air Quality

The immediate short-term impact of the proposed Metro system on air pollution will be moderate local increases in pollution levels due to construction activities and disruption of traffic. Construction activities will produce dust and diesel fumes from increased truck traffic, generators and bulldozers; furthermore, the operation of heavy equipment and the construction of cut-and-cover will create traffic congestion with its concomitant increase of high emissions from slow-moving and idling automobiles. These short-term adverse impacts will be minimized by strict observance of the pollution control measures required by WMATA construction contracts, as in the following examples:

> "The contractor shall at all times control the generation of dust by his operations in the buildings and in other construction

and storage areas. Control of dust is mandatory and shall be accomplished by water sprinkling or by other methods approved by the Engineer.

The contractor is put on notice that all burning of trees, rubbish or other material when so permitted shall be conducted in accordance with state and/or local regulations. All burning shall be done in a manner to minimize air pollution and no rubber, heavy oils, or other flammable agents which unduly pollute the air shall be used in the burning operations. When it becomes necessary, the (WMATA) Engineer will inform the contractor of unsatisfactory construction procedures and operations insofar as erosion control, water and air pollution are concerned. If the unsatisfactory construction procedures and operations are not corrected promptly, the Engineer may suspend the performance of other construction until the unsatisfactory condition has been corrected."

For fuller control of pollution, however, the cooperation of local officials is needed, since WMATA also relies on local controls for effective implementation. Local measures are expected to be followed. The following clause from a standard WMATA agreement illustrates this point:

"No burning of waste shall be allowed without written permission. When permission is granted burning shall be conducted in accordance with the regulations of the jurisdictional authority."

A 1966 study by the Metropolitan Washington Council of Governments (COG) concluded that automobile emissions are the major cause of air pollution in the metropolitan area. Automobiles are considered to be responsible for 95% of the total emissions of carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NO_x). The high proportion of commuter travel that occurs in peak hours, particularly on weekdays, causes the slow moving traffic and idling cars which, in turn produce the highest pollution levels.

The D.C. Department of Environmental Services has stated that a plan which would result in reducing significantly the number of automobiles on

city streets, especially during rush hour, and substituting them with low emission buses will affect positively pollution levels and other aspects of urban life. Although the Metro system was not considered in conjunction with this evaluation, it would obviously have even greater beneficial effects than low emission buses. Parking provisions will include provision for bicycle storage as well as bus bays, kiss and ride and park and ride spaces at many stations. The new WMATA system, together with an improved bus program, should divert a significant number of automobile trips to other modes of travel.

This judgment is supported by recent regional computer-assisted modelling of the automotive emissions produced by various transportation systems serving the metropolitan area. Prepared for the U.S. Department of Transportation by COG, the modelling study evaluated the effect of alternative transportation systems by allowing the introduction of large scale transit networks to influence the number of trip ends in a sub-area through reductions in auto ownership and in the number of vehicle trips generated. Nine future alternative highway and transit system combinations, together with the base year (1968) transportation system, were studied for their effect on auto emissions in 48 sub-areas. The sub-area emissions were then aggregated to major jurisdictional totals for comparison. The nine alternatives comprised all possible combinations of three highway systems and three transit alternatives.

The expressway systems tested by the model were:

- Existing 1968 Expressway System, which assumed that no limited-access facilities that had not been open in 1968 would be operational in 1976. (This was assumed purely for the purposes of the model, for certain facilities had been added by the time of the modelling study.)
- 1976 "Committed" System, which included the 1968 plus certain additions. It was assumed that the Virginia portions of I-66, that I-95 beyond I-495 in Maryland would be finished, that the East Leg (I-295) would be completed along the Anacostia River, and that the Center Leg (I-95) would be completed within D.C.
- 1976 Full Interstate System, which included the "Committed" system plus all Interstate links proposed in the 1968 Interstate Cost Estimates by the Maryland, Virginia, and D.C. Highway Departments.

*First paragraph expanded

REVISED

The tested transit alternatives consisted of similarly extreme cases:

- 1968 Transit, which simply assumes bus service in 1976, identical to that provided in 1968.
- "Phase III" Metro, which included the first 30 miles of Metro plus all bus service that would complement and supplement Metro at that stage.
- Full Metro, which assumed that all 98.02 miles of the Adopted Regional System would be operational in 1976 plus the bus service that would exist at that time.

As shown in the "Comparison of Auto Vehicle Trip Origin Densities for Alternative 1976 Transit Systems" map and the first table, the number of vehicle trip origins for the alternative systems varies widely. For example, based on projections of future population and employment and assuming no improvement to the transit system, 4.5 million daily vehicle trip origins are forecase for 1976, compared to 3.5 million in 1968. If the limited 30-mile Metro system is considered, the total of daily vehicle trip origins in 1976 declines to 4.0 million, i.e., the projected increase is halved. The completion (purely hypothetical) of the full 98.02-mile Metro system by 1976 would result in a projected decline of 200,000 daily vehicle trip origins from the 1968 total to only 3.3 million, despite a projected population increase of 500,000 in the same period.[1]

Forecasts of vehicle-miles of travel vary not only with the supply of transit and the number of vehicle trip origins, but also with the amount of expressway facilities as shown in the second table. In 1976 the model, as compared to a 1968 figure of just over 28 million daily vehicle miles of travel, predicts 38.1 to 39.1 million with existing traffic, 34.8 to 36.7 million with the partial Metro system, and between 31.0 and 32.7 million with the full Metro system. (The higher figure in each range assumes completion of the full interstate highway system, while the lower one indicates no additional freeways.) Within the region, vehicle miles travelled (VMT) vary considerably from sub-area to sub-area. Assuming the 1968 highway system as a given for 1976, "Phase III" Metro has its greatest effect on VMT within D.C., but the full 98.02mile system has its greatest impact in the suburbs.

Using 1976 emission rates supplied by the U.S. Environmental Protection Agency (EPA) for the Washington, D.C. area, the model predicts that substantial reductions in carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NO_x) emissions could occur without any change in either the highway or transit systems, despite an estimated increase of over 6,000,000 vehicle miles of travel daily by 1976. These reductions, caused by better emission controls in newer vehicles, would be: 57% for CO, 63% for HC, and 25% for NO_x, based on the assumption that the 1975 automotive emission standards are met and are fully effective.

[1]Note: These figures are based upon Wash COG 1972 study; results of a draft Wash COG 1975 study are discussed on Pages 26a-26h, and in Appendix H in part 3 of this study.

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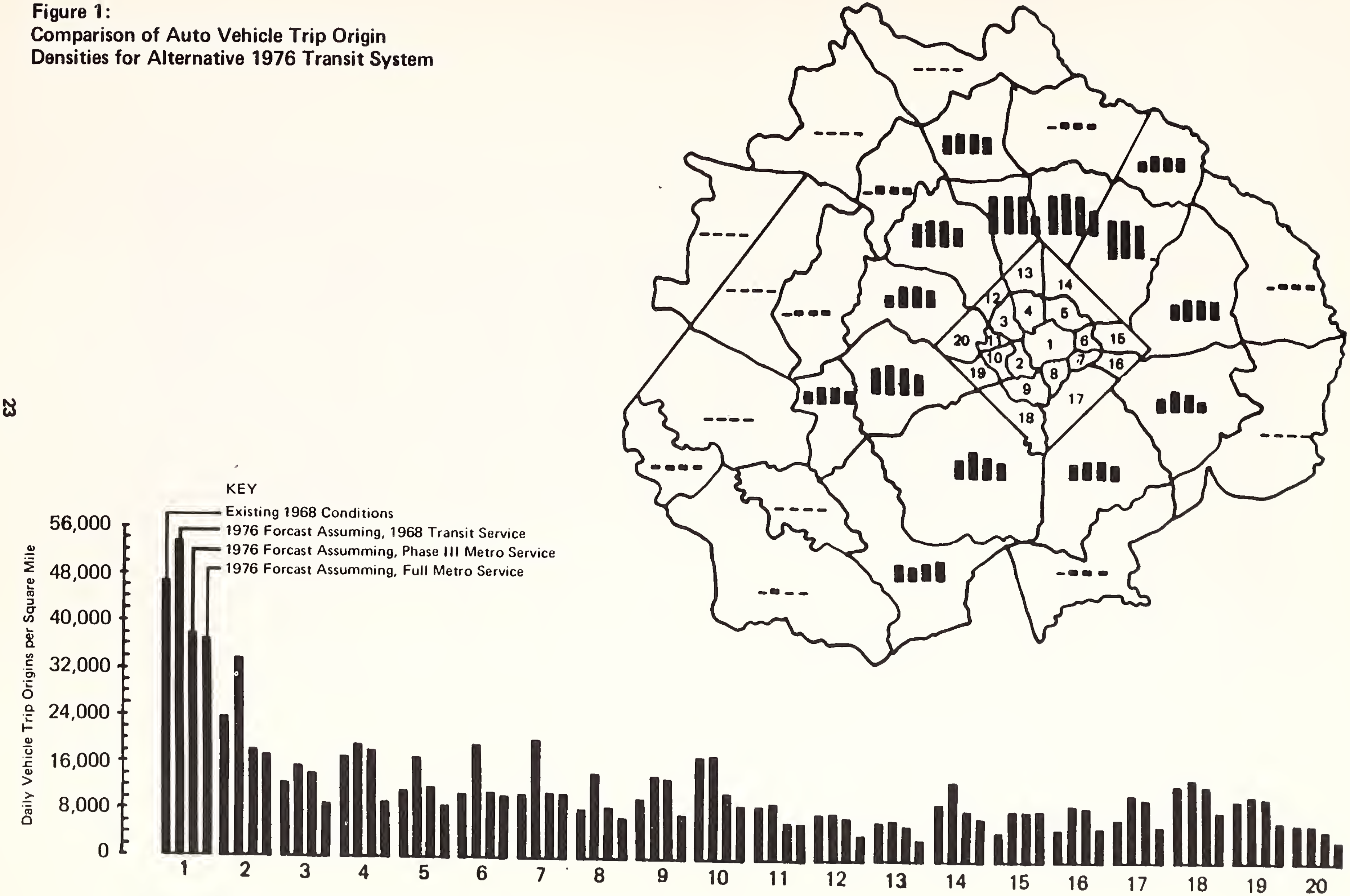
Figure 1:
Comparison of Auto Vehicle Trip Origin Densities for Alternative 1976 Transit System



Source: Estimating Automotive Emissions of Alternative Transportation Systems, COG, March 1972.

Table 7:
Auto Vehicle Trip Origins (In 1000's) By Jurisdiction for Home Based and Non-Home Based Trips

Jurisdiction	1968 Base Year Conditions[1]			1976 Activities – 1986 Transit[2]			1976 Activities – Phase III Metro[2]			1976 Activities – Full Metro[2]		
	Home	Non-Home	Total	Home	Non-Home	Total	Home	Non-Home	Total	Home	Non-Home	Total
District of Columbia	210	516	726	242	897	1,139	184	669	853	116	551	667
Montgomery Co.	308	420	728	383	471	854	349	472	821	249	405	654
Prince George's Co.	404	473	877	519	553	1,072	446	553	999	353	476	829
Maryland	712	893	1,605	902	1,024	1,926	795	1,025	1,820	602	881	1,483
Virginia (inside 10 mi.sq.)	146	252	398	126	317	443	96	254	350	76	174	250
Virginia (outside 10 mi.sq.)	330	424	754	481	545	1,026	408	550	958	328	524	852
Virginia	476	676	1,152	607	862	1,469	504	804	1,308	404	698	1,102
Region	1,398	2,085	3,485	1,751	2,783	4,534	1,483	2,498	3,981	1,122	2,130	3,252

[1] Based on MWCOG 1968 Home Interview Survey data

[2] Estimated for a preliminary forecast of 1976 activities

Source: "Estimating Automotive Emissions of Alternative Transportation Systems", COG, March 1972

Table 8:
Daily Automobile Vehicle-Mile-Of-Travel (In 1000's) By Facility Type for Alternative 1976 Transportation Systems

Transportation Alternatives

	Highway Component	1968 Existing Expressway System				1976 "Committed" Expressway			1976 "Full Interstate"		
Jurisdiction	Transit Component / Facility Type	1968 Bus System[1]	1968 Bus Service	Phase III Metro	Metro A.R.S.	1968 Bus Service	Phase III Metro	Metro A.R.S.	1968 Bus Service	Phase III Metro	Metro A.R.S.
District of Columbia	Expressways	1,090	1,292	1,163	1,039	1,735	1,569	1,424	2,649	2,366	2,184
	Arterials	4,282	5,658	4,833	4,411	5,231	4,683	4,275	4,912	4,413	4,019
	Locals	1,302	1,971	1,648	1,449	1,893	1,662	1,457	1,730	1,520	1,324
	All Facilities	6,674	8,921	7,644	6,899	8,859	7,914	7,156	9,291	8,299	7,527
Maryland	Expressways	3,196	3,658	3,465	3,013	4,249	4,102	3,574	4,714	4,539	3,929
	Arterials	6,552	8,758	8,238	7,201	8,237	7,935	6,942	8,082	7,794	6,837
	Locals	2,180	3,772	3,515	3,030	3,798	3,639	3,141	3,720	3,565	3,081
	All Facilities	11,928	16,188	15,218	13,244	16,284	15,676	13,657	16,516	15,898	13,847
Virginia	Expressways	2,991	3,536	3,270	2,999	4,182	3,918	3,548	4,182	3,918	3,548
	Arterials	4,795	6,626	6,130	5,541	6,240	5,877	5,336	6,240	5,877	5,336
	Locals	1,671	2,792	2,559	2,283	2,906	2,718	2,437	2,906	2,718	2,437
	All Facilities	9,457	12,954	11,959	10,823	13,328	12,513	11,321	13,328	12,513	11,321
Regional Totals	Expressways	7,277	8,486	7,898	7,051	10,166	9,589	8,546	11,545	10,823	9,661
	Arterials	15,629	21,042	10,201	17,153	19,708	18,495	16,553	10,234	18,084	16,192
	Locals	5,153	8,535	7,722	6,762	8,597	8,019	7,035	8,356	7,803	6,842
	All Facilities	28,059	38,063	34,821	30,966	38,471	36,103	32,134	39,135	36,710	32,695

[1] Figures in this column are base year values based on conditions that existed in 1968. (All other columns show estimates based on a preliminary forecast of 1976 activities.)
Source: "Estimating Automotive Emissions of Alternative Transportation Systems", COG, March 1972.

In the case of every pollutant, and for each of the three highway systems, the full Metro system produces about a 20% additional reduction from the emission levels produced by the alternatives that include the 1968 transit (bus) system. The differences in emissions between the highway configurations studied never exceeded 5% when transit services were held constant.

The additional transit services will have their greatest impact on emission levels in the District of Columbia and the downtown central business district or "core" area. Maryland and Virginia will also experience drops of 15 to 20% in emissions as a result of Metro operations.

Local concentrations of auto emissions could result at stations with kiss-and-ride and bus bays, and particularly at stations with extensive parking facilities. For example, Rosslyn and Pentagon Stations, which are to serve as major bus transferral points with increased disembarkation of passengers, and the National Airport Station, which is to be part of a major transportation center, are likely to show minor increases in peak hour pollution on a local level, but not greater than existing high levels.

For this more localized effect on air quality, more detailed studies will be made for stations when it is expected that a station design will have a significant effect on local air quality or new information on a station's air quality impact is available.

Metro could represent a shift from fossil fuels to electrical power, a factor which would be positive in the long-term. While Metro will increase the electrical power demands in a rapidly growing region, nonetheless, by diverting automobile users to transit, it will also help slow the rapid increase in fossil fuel consumption by automobiles. Most of Metro's new power demand is likely to be supplied by nuclear power plants with full water recirculation. The pollution associated with thisform of nuclear energy will be of a different character and probably less than that which accompanies the use of fossil fuels.

Another study of the air quality impacts prepared by the Washington Metropolitan Area Council of Governments is contained in a recently completed interim draft study of Air Quality Impacts and Energy Impacts of the WMATA System for WMATA (1975). This study is presented in full in Part III of this Study, the Appendices. This study performed a more detailed analysis than the 1972 study discussed previously. WMATA has requested that Wash., COG expand the interim draft study, particularly in the area of description of method and assumptions, and an analysis of the implications of the method and assumptions in evaluating the results of the study; WashCOG is further requested to discuss the results of the study in considerably greater detail in the context of related long range regional and national goals. Specifically, WashCOG has been requested to discuss and analyze the following items:

1. An assumption is made in modeling that the land uses throughout the system will be the same whether or not the Metro rapid rail system is built in both 1982 and 1992. Such an assumption omits the dynamic relationship between the system and the region's growth pattern and is likely to understate Metro ridership and pedestrian station access.

2. Highway networks are assumed to be the same with and

without Metro; projections of vehicle miles travelled both with and without the Metro rapid rail system in 1992 exceed the capacity of the road system assumed; parts of the highway networks assumed in Fairfax and Arlington Counties are not approved.

3. The same level of Metro ridership and of feeder bus service is assumed in 1982 and 1992, although the rail system is assumed to be expanded.

4. The following parking factors are not considered: cost and capacity for parking in the Central Business District with no rapid rail system; surcharges for parking to achieve air quality goals; District policies limiting parking.

5. Transit trips are estimated for peak hour work trips only, whereas energy consumption by the Metro system is calculated for the full day.

6. Energy for conversion of coal or gas to electricity does not appear to reflect improved efficiency over time; alternative methods of energy generation are not analyzed; isochronal figures suggest that additional consideration should be given to more efficient use of gasoline on less congested highway network with rapid rail systems; present and projected shortages of gasoline and petroleum are not considered.

7. Energy consumption estimates prepared by Louis T. Klauder and Associates under subcontract to Alan M. Voorhees for the WMATA Net Income Analysis (WMATA contract number 903184) have not been evaluated.

Although the study is still in draft form, and has not been formally yet accepted by WMATA, a summary of the draft findings is set out below.

Summary of Current Air Quality Study

The overall impact of Metro on the region will be to reduce motor vehicle miles traveled, improve speeds, reduce air pollution emissions, improve air quality and significantly reduce the percentage of the population exposed to air quality levels exceeding the air quality standards, reduce gasoline and diesel fuel consumption, increase consumption of fossil fuels used in electricity generation, and overall, slightly increase energy consumption on a BTU-equivalent basis.

Four tests of the Metro system were made: with and without Metro for 1980 and 1992. For each year the land use, highway configurations and emission characteristics remain the same, so the only change is the existence or non-existence of the Metro system and associated feeder bus system. The accompanying figure compares the Vehicle Miles Traveled (VMT), average vehicle speeds, hydrocarbon and carbon monoxide emissions and energy resources for the four test cases.

[1] Note: The results of this study contrast with those of the 1966 study discussed on the preceding pages in that the latter assumes that nuclear energy is a likely power source for the electrical system.

COMPARISON OF METRO ALTERNATIVES

	1980 without	1980 with	1992 without	1992 with
VMT (millions/day)[1/]	44.3	42.7	66.5	64.2
Speed (average miles/hour)	25.7	26.5	24.2	25.0
Hydrocarbons (tons/peak 3 hours)	24.6	22.8	6.91	6.59
Carbon Monoxide (tons/peak 8 hours)*	1170	1100	422	405
Energy Consumption per Year				
Gasoline (millions of gal.)	1062.1	1024.7	1284.3	1239.4
Diesel fuel (millions of gal.)	24.1	18.9	27.8	18.9
Residual Oil (millions of gal.)	--	34.1	--	32.0
Coal (thousands of tons)	--	267.2	--	156.9
Overall Btu Equivalent (x 10^{12})	139.3	145.8	168.2	170.2

*per peak period during an average day

1/ 24 hour average, all purpose, Auto driver plus taxi trips.

Comparison of the years, 1980 and 1992, is not relevant to this project, but a few comments are appropriate to explain the rather significant changes. With or without Metro, the 1992 travel is significantly greater than the 1980. However, due to the anticipated changes in the emissions of new vehicles as a result of the Federal new car emission control program, the emissions of hydrocarbons and carbon monoxide are significantly lower by 1992.

The effect of Metro rail service on core-oriented work trips is significant. These work trips to downtown are most readily diverted to transit and related to urban air quality levels.

Metro rail service will lead to a 41% increase in transit work trips in 1980, and a 48% increase in transit work trips in 1992--both compared with no Metro for those years.

For work trips to the core in 1980, there would be a 32% increase, and in 1992 there would be a 40% increase in transit trips with Metro as compared to the no Metro alternative.

Viewed in another way, Metro construction would attract 69,000 transit work trips to the core in 1980, and 96,000 such trips in 1992--both over and above the non-Metro comparisons. Assuming average occupancy, peak period and high-

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way lane capacities, the equivalent highway lanes to handle potential core work trips to Metro but not to existing transit would be six lanes of freeway or 13 lanes of arterial for 1980, and eight freeway lanes and 18 arterial lanes in 1992.

It is important to note that population, employment and housing forecasts utilized in the four tests in this study were based on the so-called EMPIRIC 6.2 (modified) forecasts which were approved by the local governments of the region for study purposes. These forecasts were not designed to maximize usage of the Metro rapid rail system. However, if local government policies in the future were to attempt to obtain maximum transit utilization through the location of population, employment and housing, it is anticipated that the air quality and energy impacts of Metro would be reduced to a more significant degree than is possible under existing planning policies.

In 1980, the deletion of the Metro system would result in less transit travel and more pollution emissions (see the accompanying figure). The increase in travel of 3.5% results in a 7.3% increase in hydrocarbons (HC) emissions and 6.0% in carbon monoxide (CO) emissions. The greater effect on air quality is due to the improvement in speeds for the vehicles which remain on the roads. In 1992, the effects are similar to the 1980 effects, in both direction and magnitude. Without Metro in 1992, the increases would be 3.5% for VMT, 4.6% for hydrocarbons, and 4.0% for carbon monoxide. The emissions of trucks are also slightly increased if Metro is not built because the road speeds would be approximately 3.0% slower. These reductions in HC emissions will have a significant impact on improving the region's photochemical oxidant problem.

For carbon monoxide the emissions calculations were entered in a dispersion model which calculates the concentrations of pollution at given receptor points throughout the region. The model disperses the pollution emissions from their points of origin due to the wind speed and direction, as well as the stability of the atmosphere. For the purposes of this report the calculated concentrations are the average air quality throughout a grid which is 2.5 km on a side. These concentrations, termed urban background, represent the accumulated effects of sources in the vicinity of the receptor. The precise estimate of air quality at a given receptor involves the addition of the natural background, the urban background and the contribution from very localized sources.

PERCENT CHANGE IN FACTORS AS A RESULT OF DELETION OF METRO

	1980	1992
VMT	+3.5%	+3.5%
Speed	-3.1%	-3.3%
HC	+7.3%	+4.6%
CO	+6.0%	+4.0%
Energy	-4.5 %	-1.1 %

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The CO urban background air quality for both years is reduced significantly when the Metro operations are compared to the no-Metro test. The accompanying figure presents information on maximum concentration reductions, geographic areas of exposure reductions and percentage of households and employment affected. The 1992 maximum level is predicted to be reduced by about 10%. In addition, the geographical area which is at the threshold of the air quality standard violation (5-10 mg/m^3) is reduced by approximately 35%. This area, while small geographically, contains over 20% of the households and employment in the region.

The reductions in both maximum levels and the size of the affected area for 1980 by the operation of Metro as compared to without Metro are greater than in 1992. Maximum urban background is reduced from 22 to 20 mg/m^3--about 9%. The area affected by the air quality standard violation (10 mg/m^3 or above) is reduced by about 45%. This area contains almost 40% of the region's households and employment. This represents a significant decrease in potential exposure of individuals to levels of air pollution exceeding the standard.

PERCENT REDUCTIONS IN CARBON MONOXIDE

AIR QUALITY WITH METRO OPERATION

	1980	1992
Maximum CO Concentrations	-10%	- 9%
Area of Exposure	-35%	-45%
Households and Employment in Exposure Area	20%	40%

The energy impacts of the Metrorail system were analyzed within the framework of the ground passenger transportation fuel demand sector, and fuel requirements were reduced to BTU equivalents to provide a basis of comparison between transportation modes and between fuel forms for the years 1980 and 1992.

The analysis shows that, assuming a completed Adopted Regional System for 1980 and 1990, total BTU's consumed will be 3.5% and 1.1% greater, respectively, with the Metrorail system than without the system, based on an assumed consumption of 1.2 billion kilowatt-hours by Metrorail in each of the forecast years.

The overall effect of the Metrorail system is to require the substitution of coal and oil used in production of electricity for gasoline and diesel fuel associated with the reduction of automobile and bus vehicle miles travelled. In effect, this represents the shift from a potentially scarce fuel (gasoline) for a more plentiful fuel (coal) in future years. In addition, the increase in use of nuclear generating facilities by PEPCO and VEPCO in future years will reduce the reliance on fossil-derived fuels for ground passenger transportation.

Summary of Current Energy Study

The accompanying tables summarize the 1980 and 1992 level of fuel consumption devoted to the ground passenger transportation system with and without Metrorail operation. In 1980 operation of the Metrorail system will reduce gasoline and diesel fuel consumption by 5.5×10^{12} BTU and will be offset by an increased requirement of 12.1×10^{12} BTU for electricity generation. In 1992 gasoline and diesel fuel requirements will be reduced by 6.9×10^{12} BTU and offset by an increased fossil fuel requirement of 8.9×10^{12} BTU for electricity production.

Qualitatively, operation of the Metro rail system will shift ground passenger transportation fuel requirements away from motor gasoline and diesel fuel to coal and residual oil. To the extent that the utilities can in the future make use of non-fossil fuels, this qualitative judgement can be modified accordingly. It should be pointed out, too, that the estimates of fuel consumption, both by motor vehicles and in electricity generation, are highly sensitive to such variables as vehicle efficiency, BTU equivalent values of fuels, and the future fuels mix utilized by utility companies. Because VMT estimates vary so little with and without Metro, alteration of the critical assumptions entering into this analysis could significantly alter or even reverse the summary conclusions reported. The accompanying table summarizes the overall impacts on a BTU accounting basis of the energy impacts of Metro for 1980 and 1992.

This work is based on an auto VMT reduction of 3.5% in 1980 and 1992 and is based on land use assumptions contained in COG's "6.2 Modified" projections of future allocations of households and employment. As pointed out earlier in Section II, this assumed land use pattern is not necessarily that which is most likely to result from the completion of the Metrorail system.

Preliminary tests performed by COG in conjunction with an analysis of the energy implications of future land use alternatives indicates that total VMT could be reduced by 15%

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Fuels Consumption for Ground Passenger Transportation, Washington Metropolitan Area, 1980, With and Without Metrorail System

	Gasoline (Million gallons)		Diesel Fuel (Million gallons)		(No. 6 Oil) Residual Oil (Million gallons)		Coal (1000 tons)	
Mode	With	Without	With	Without	With	Without	With	Without
Automobile	1024.7	1062.1	--	--	--	--	--	--
Bus	--	--	18.9	24.1	--	--	--	--
Rapid Rail	--	--	--	--	34.1	--	267.2	--
Diff. with METRO	-37.4		-5.2		+34.1		+267.2	
Percent change with METRO	- 3.5%		- 21.6%		--		--	
Btu equivalent in 10^{12}	- 4.8		-0.7		+ 5.1		+ 6.9	

Conversion from Btu to Fuels:

Coal = 13,000 Btu/lb

No. 6 Oil = 150,000 Btu/gallon

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Fuels Consumption for Ground Passenger Transportation, Washington Metropolitan Area, 1992, With and Without Metrorail System

Mode	Million Gallons Gasoline		Million Gallons Diesel Fuel		Million Gallons Residual Oil		(1000 tons) Coal	
	With	Without	With	Without	With	Without	With	Without
Automobile	1,239.4	1,284.3	--	--	--	--	--	--
Bus	--	--	18.9	27.8	--	--	--	--
Rapid Rail	--	--	--	--	32.0	--	156.9	--
Diff. with METRO	-44.9		-8.9		+32.0		+156.9	
Percent change with METRO	- 3.5%		-32.0%		--		--	
Btu Equivalent (10^{12})	- 5.7		-1.2		+ 4.8		+ 4.1	

Conversion from Btu to Fuels:

Coal = 13,000 Btu/lb

Oil = 150,000 Btu/gallon

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Estimated BTU Equivalent Fuels Consumption For Ground Passenger Transportation System, Washington Metropolitan Area, 1980 and 1992

(in 10^{12} BTU)

	1980		1992	
	With Metro	Without Metro	With Metro	Without Metro
Automobile	131.16	135.95	158.64	164.39
Bus	2.63	3.35	2.63	3.86
Rail (Oil)	5.12	--	4.80	--
Rail (Coal)	6.95	--	4.08	--
Total	145.86	139.30	170.15	168.25
Increase with Metro	4.7%		1.1%	

below the VMT resulting from 6.2 Modified projections, assuming a land use pattern consisting of the incremental growth of households and employment locating in balanced communities in Metrorail corridors, and concentrated at transit stations. Such an assumption would significantly alter the conclusions of the energy impact analysis, and would, in fact, result in a total BTU consumption considerably <u>less</u> than the "without Metrorail" cases for 1980 and 1992. That is to say, total energy consumption is highly sensitive to auto VMT--for each reduction of 1,000,000 miles daily VMT, total BTU's are reduced by about 3.0×10^{12}.

In addition to the regional level analysis included herein, a further study that should be considered is an analysis of the energy efficiency of the Metrorail system, compared to equivalent trips made by automobile and by bus. This analysis would require data on passenger-miles for each mode.

NOISE AND VIBRATION

Noise pollution generated by the proposed Metro system is primarily a local or site scale problem rather than a regional one. The audial effects of both the construction and the operation of the system are noticed only in proximity to the specific route in question. The noise produced by Metro in a community may be either air-borne or ground-borne. Air-borne noise is produced by transit trains travelling at grade or on aerial structures or by Metro associated facilities, such as vents and shafts, an air conditioning chiller plant cooling tower, and electrical traction power substation transformers. Ground-borne noise, produced where Metro runs at-grade or on aerial structures, is less likely to be problematic, seldom exceeding acceptable levels for the current land use. In some cases the above ground noises of the Metro system will be partially masked by the already existing noises of street traffic, railroads or the airport.

This will be the case primarily for those areas where the surface track facilities will be located in a freeway median. The noise from the freeway traffic is generally of a level equivalent to or higher than the peak level from the transit trains. There are other situations, such as along railroad corridors or near the airport, where the transit train noise may be audible at times when there is no noise due to aircraft or railroad traffic. However, the peak noise levels and durations of the transit train noise will be considerably lower than that due to the pre-existing noise from other sources. Therefore, the Metro operations will have little effect on the overall or total noise exposure.

In the subway sections of Metro, vibration-induced ground-borne noise, produced by the wheel-road contact surface, will be transmitted through the ground to adjacent buildings. In cases where sensitive instruments are being used, the vibrations themselves become important. The ground-borne noise propagated within the buildings is the most serious noise and vibration problem as well as the most costly to alleviate. Two methods being used to overcome this problem are discussed in WMATA's <u>Criteria Being Used in Selecting the Location of Floating Slabs</u>:

> "First, Metro's entire underground track system will be mounted on resilient pads which cushion the rails and reduce vibrations transmitted to the invert slab of the subway....Second, wherever calculated noise levels in buildings adjacent to the Metro underground right-of-way are greater than those normally acceptable to the community, 'floating slab' type construction is (to be used)."

In addition to vibration control, the noise from the operation of the surface and aerial portions of the Metro system will be reduced where necessary by using earth berms or mounts and sound barrier walls as sound buffers.

The firm of Wilson, Ihrig & Associates, Inc. undertook a study of acoustics and vibration control problems for WMATA. Investigations included the testing of the floating slab section in a completed portion of subway, a survey of preconstruction noise and vibration at critical buildings and areas, and the preparation of noise criteria and standards, to conform with adjacent land uses. In addition, the consultants review acoustical treatment in contracts and general plans and make recommendations which WMATA reviews and implements as required in contract drawings and specifications. The noise criteria developed for WMATA by Wilson, Ihrig & Associates are summarized below:

Vibration-Induced Noise Criteria

The structural vibration in buildings adjacent to the tunnels, which is created by the ground vibration, can generate audible noise within the same building spaces; a low rumbling sound. In older transit systems, this has resulted in sufficient noise level for occupants of buildings to be annoyed by the train passage or at least be aware of the train passage.

The principal noise sources in modern buildings are the air conditioning and ventilating systems, the machines used in everyday living, and background noise transmitted into the building from exterior noise sources, principally street traffic. The recommended background noise levels for modern office buildings and schools range from NC-30 to 35. Many offices actually have background levels as high as NC-45. For residential buildings, in sleeping quarters, the recommended range of background levels is NC-20 to 30. The background level in commercial buildings, such as retail stores, is generally in the range of NC-40 to 50.

The appropriate audible noise criteria for the rumble from passing transit trains depends on the activities of the occupants and on the background noise level in the area. In general, it is found that persons occupied with various tasks or recreational activities are not aware of an intruding transient noise until its Noise Criterion level is about 10 decibels greater than the typical background noise of the room. Conversely, it is possible for persons who are quietly sitting and listening to sound to detect an intruding transient sound when it is about 5 decibels less

than NC level than the background noise level. It is, therefore, necessary to adjust noise criteria for most spaces since there are usually several varieties of activities. Also, it would be unreasonable in all cases to design for a noise level that is undetectable by occupants.

The most critical applications where the noise from transit train operations could create intrusion are sleeping rooms and auditoriums or concert halls. In these types of spaces the design should be that the transit train intrusion noise level be comparable to or less than the background noise of the space.

There are three general ranges of areas or community types where residential buildings and sleeping rooms are located:

I - Quiet residential areas where the exterior background noise may be 35 to 40 dBA at night.

II - Average urban or suburban residential areas with background noise level of 40 to 45 dBA at night.

III - Noisy urban residential or average semi-residential-commercial areas with background noise level of 45 to 55 dBA at night.

For these three general types of areas the background noise in sleeping spaces is different and the allowable noise level from the transit trains can be greater in the noisier areas. The following tables indicate the range of acceptable levels and the recommended maximum levels for the noise generated by transit trains due to mechanical vibration of the building structures:

Table 9: Acceptable Levels for the Rumbling Noise Which Can Occur in Residential Buildings Near Tunnels as Transit Trains Pass By

Type of Building or Space	Type of Residential or Community Area	Acceptable Noise Level
Sleeping Rooms in Private Residences	I	NC-20 to 25
	II	NC-25 to 30
Apartments (in Residential Units)	I	NC-25 to 30
	II	NC-30 to 35
	III	NC-35 to 40
Hotels (in Residential Units)	II	NC-30 to 35
	III	NC-35 to 40

*expanded

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Table 10: Recommended Maximum Levels for the Rumbling Noise Which Can Occur in Occupied Spaces of Buildings Near Tunnels as Transit Trains Pass By

Type of Building or Space	Recommended Maximum Noise Level
Auditoriums and Concert Halls	NC-20
Churches and Theaters	NC-25
Music Rooms and TV Studios	NC-25
Hospital Sleeping Rooms	NC-30
Courtrooms	NC-30
Schools	NC-30
University Buildings	NC-30 to 35
Offices	NC-30 to 35
Commercial Buildings	NC-40 to 45

Ground-borne noise and vibration is a potential problem associated with Metro; however, it is not the most serious except perhaps in terms of the cost of providing for reduction of the ground-borne vibration in especially critical areas. The cost of floating slab trackbeds, for reduction of ground-borne vibration and noise by 10 to 15 dB, is considerably greater than the cost of sound barrier walls for reduction of air-borne noise from surface or aerial structure operations by about 10 dB. The noise criteria curves are applicable for description of the vibration impact because the only perceptible effect of the ground-borne vibration is a low pitched rumbling noise generated or induced by building structure and wall assembly vibration in response to the ground-borne vibration from the trains. With modern transit systems the amplitudes of the ground-borne vibration at low frequencies are orders of magnitude less than the vibration amplitudes produced by railroad operations. As a result the amplitude is below the threshold of perception (or the threshold of feelability) for people even at locations very close to the transit system tracks.

For either subway, surface, or aerial structure operations the ground-borne vibration is not perceptible as mechanical motion at distances of 30 to 40 feet or more from the track centerline. The surface or aerial structure facilities will not be located sufficiently close to buildings or other occupied areas to make the ground-borne vibration a significant factor in the intrusion. In all cases of surface and aerial structure applications the air-borne noise due to other sources and the air-borne noise from the transit trains will be the controlling factor. The ground-borne vibration will not be perceptible vibration and the induced noise will not exceed the amplitudes of noise due to other sources or other paths.

For subway operations the low frequency rumbling noise generated by the ground-borne vibration transmitted to adjacent buildings can be perceptible and can be of levels sufficient to produce intrusion in buildings very near the subway structure or in lightweight buildings within 50 to 100 feet of the subway structure. Because of this possibility, all sections of the subway structures are being analyzed to determine the expected noise level in the buildings along the subway structure. The analysis includes determination of the expected effect of building type, distance from the subway, speed of train operation, type and depth of subway structure and the type of geological material in which the subway structure and the building are located. From these estimates of the ground-borne vibration levels and the coupling of the ground-borne vibration with the building, estimates of the low frequency noise level in the buildings is determined. Comparison of this noise level with the criteria applicable to the type of building occupancy is used to determine if the noise will be acceptable or if the floating slab is needed to reduce the ground-borne vibration and make the noise of acceptable level.

For special cases where the ground-borne vibration amplitudes could be of significance to sensitive instruments the vibration level itself has been and will be evaluated in terms of the acceptability of the vibration environment for the sensitive instruments. The most commonly encountered sensitive instruments are electron microscopes, optical equipment, and computer equipment involving magnetic disc drives. As each situation is encountered the vibration from the transit train operations is estimated and compared with the established or estimated criteria for the sensitive instrument to determine the acceptability of the situation or to determine if special vibration reduction considerations are needed in the design of the transit system facilities.

In summary, noise criteria curves are applicable to describe ground-borne vibration impact because the vibration is perceived by people only as an air-borne noise generated by the vibration - the vibration is not perceptible as a mechanical motion or perceptible vibration. The problem of the noise generated by the ground-borne vibration is serious because of the very great attenuation rate of vibration transmitted through soil, because of the decoupling which occurs at soil-building interfaces, and because of the low vibration levels which are inherent in a modern transit system with lightweight vehicles, continuous welded rail and resilient rail fasteners, the levels are inherently low at most buildings and very restrictive criteria can be applied as indicated by the Table accompanying this section.

It should be emphasized in evaluating the criteria given in this table, that the noise from the transit trains is a transient noise and that the criteria applied are appropriate for steady-state noise. Thus, the criteria are very restrictive since transient noise of the low frequency rumbling character can exceed the typical background noise level by up to 10 decibels before it is noticeable under normal circumstances. It is, of course, possible to hear the noise at lower levels if one's attention is focused on noise. However, such levels are not intrusive and do not represent a significant impact.

Wayside Noise Criteria

For the most part, passby noise which is similar in character to the community background noise, and which has no outstanding or noticeable characteristics, is generally found to be acceptable. The passby noise of a well muffled passenger automobile is of this nature, as is the passby noise of the newer transit trains operated on continuous welded and ground rail. With the new rail systems, the characteristic "clickety-clack" noise is not present as it is for older systems with rail joints, and the noise is less distinctive with little identifiable character when compared with noise from street and highway traffic. It has been found for noise from freeway traffic or other sources which create transient noise that at distances where the peak sound level is 70 dBA or less there are no further complaints and the noise is generally considered acceptable. The reasons for this acceptability include considerations with regard to speech intelligibility, levels of noise transmitted into building interiors, and annoyance.

These and other considerations provide a basis for the selection of 70 dBA as the maximum acceptable level for the noise from a surface vehicle in quiet residential areas. For other types of areas, particularly those which are noisy, higher noise levels from vehicles are acceptable and it is necessary to define types of areas or communities and appropriate criteria for each type of area. That is, in defining the areas where sound barrier walls should be used and those areas where separation distance is adequate to give satisfactory results, it is necessary in the planning and design of the transit system to consider the type of community in which the right-of-way is located and the relationship of the transit tracks to other community facilities, such as highways and boulevards, which are significant noise sources. The following table shows five general categories or urban and suburban areas along Metro routes.

*expanded

Table 11: Ambient Noise Levels at Night in General Community Categories Along Metro Corridors

Area Category	Area Descriptions	Typical Measured Ambient Noise Levels at Night
I	Quiet urban residential, open space park, suburban residential or recreational area. No nearby highways or boulevards.	35-40 dBA
II	Average urban residential, quiet apartments and hotels, open space, suburban residential, or occupied outdoor area near busy streets.	40-45 dBA
III	Busy urban residential, average semi-residential/commercial areas.	45-55 dBA
IV	Commercial areas with office buildings, retail stores, etc., with daytime occupancy only. Open space, parks and suburban areas near highways or high speed boulevards with distant residential buildings.	Over 55 dBA
V	Industrial or Freeway and Highway Corridors with either residential or commercial areas adjacent.	Over 60 dBA

The appropriate design goal for the single event maximum transient air-borne noise from Metro system trains operating on surface tracks or aerial structure should be 65 to 70 dBA. The 70 dBA maximum should be applied to operations with 8-car trains at the maximum speed (70 mph). The following table indicates the appropriate maximum passby noise level for maximum length trains for each of the five general area categories. In each case the criteria given are the maximum recommended levels and the design goal should be 0 to 5 dBA less than the stated criteria.

to 70 or 75 dBA maximum when other transient noise sources of higher level and perhaps greater frequency are present in the neighborhood. Again, in the future when and if the vehicular traffic noise emission is significantly reduced it will be possible within the limitations of the transit system technology to afford greater noise reduction. However, in the initial design and construction of the facility it is not appropriate or justified to use the quiet residential area criteria for the transit system air-borne noise in a noisy residential or in a semi-residential/ commercial area. There are, of course, instances where the semi-residential areas may be very quiet. These, of course, will be found during the examination of the routes and variance to the general rules will be applied in determining the appropriate transit system facility design.

Comparison of the expected maximum noise levels for passbys at various operational speeds for the WMATA system for aerial structure operation and for at-grade track operation, levels confirmed by operations at the new Bay Area Transit District system, indicates that the noise levels are considerably lower than the noise levels which are allowed by the EPA proposed rules for heavy vehicles - trucks and buses - and which are likely to be proposed as railroad and aircraft noise standards. The intent with the Metro design is not to take advantage of excessive ambient noise conditions to justify additional loud sources but rather to evaluate the character of the area in which the Metro facilities are located and by appropriate evaluation and design to avoid unnecessary expense in quieting the operations in those areas where such quieting will not benefit the system neighbors.

The transit system trains and individual vehicles will meet the requirements of the California Vehicle Noise Code for noise emission, the most restrictive vehicle code in the nation and the model for the rules proposed by the EPA. Full length transit trains operating at high speeds, therefore, make noise levels considerably less than the present generation of trucks and buses which operate without controls. The transit train noise is comparable to or less than the noise from trucks and buses which do meet the requirements of the California Vehicle Noise Code and the EPA proposed rules. It is therefore apparent that the trains will not be an additional "loud" noise source out of character with the existing noise sources and in most cases will be considerably less than the existing noise sources.

If at some time in the future the transit train noise does become significant, it is possible to add a sound barrier wall thus achieving approximately 10 dBA reduction. Under these circumstances the performance of the transit trains is better than contemplated by even the most severe potential restrictions on vehicular traffic noise emissions. The sound barrier wall required for such performance improvement is only about 3 feet high above top-of rail or 4 feet high above the grade level for ballast-and-tie tracks, and 4 feet above deck level for aerial structures. It is therefore apparent that when and if the proposed rules on vehicular, railroad and aircraft noise emission do have a significant effect and excessive ambient noise conditions are corrected, it will be a relatively simple matter to substantially further reduce the transit system noise at relatively low cost. Barrier walls could be added should the transit train noise ever become a significant or predominant noise source in areas where special noise reduction was not considered because of existing conditions due to vehicular traffic noise, railroad noise or aircraft noise.

Because of the normally uniform scheduling of transit trains the noise exposure is essentially defined when the maximum or peak noise level is specified. Thus, the most important part of the specification is the maximum or peak level since this is a most significant factor with regard to community annoyance. A maximum level of 70 dBA for quiet residential areas is reasonable, is a level technologically feasible for the transit system and is a level which gives noise exposure well within the normally acceptable range for residential areas. For the noisy or semi-residential areas peak levels of 75 to 80 dBA similarly are well within the normally acceptable range for residential areas and, again, provide a reasonable acceptable level for the residents while avoiding excessive or unnecessary expenditure of funds in construction of the transit system.

There is a large body of evidence and experience to indicate that transient noise levels of 70 dBA for outdoor air-borne noise, in the presence of normal background noise in average or typical residential areas, is an acceptable value and does not create unusual or unacceptable intrusion. Automotive traffic on residential streets, with well muffled vehicles travelling 20 to 30 mph, results in transient noise levels of about 70 dBA peak level at the residential buildings along the streets. This is certainly an audible level but a very commonly encountered and commonly considered acceptable level.

calculated on a noise exposure basis a noise criterion of 70 dBA maximum is considerably more restrictive than other criteria, for example, the criteria applied to highway noise. The Federal Highway Administration (FHWA) Interim Noise Standards and Procedures, PPM 90-2 indicate that for highway design an L_{10} level of 70 dBA for exterior noise is acceptable for residential areas and including areas with schools, churches, libraries, hospitals, recreation areas, and parks. An L_{10} level of 70 dBA permits peak levels of 80 to 90 dBA. The only requirement is that the average peak level, which is the approximate definition of L_{10} (the 10 percentile noise level) not exceed 70 dBA. Similarly, a noise level of 80 dBA for transit train passbys falls within the "normally acceptable" range in the current HUD criteria for non-aircraft noise in residential areas. Thus a restriction of 70 dBA for quiet residential areas is actually more restrictive than the HUD criteria for normally acceptable noise exposure in residential areas. A peak noise level of 80 dBA for the semi-residential/commercial or noisy residential areas is within the HUD criteria for normally acceptable residential noise exposure. In the design of transit system facilities the concepts of noise exposure could be used to derive a maximum permissible noise level from the transit trains. The lack of correlation of the noise exposure figures with the response of residential communities, indicates that the specification of the maximum peak noise level provides better protection for the residential community and, in effect, defines an exposure level of considerably lower value than is applied to many normally encountered community noises. Basically the current HUD criteria indicates the noise environment to be normally acceptable for residential areas if the noise does not exceed 65 dBA for 16 hours per day and 80 dBA for the remaining 8 hours. This is defined on the basis of L_{50} or the average noise level.

Such criteria allows transient noise levels of much higher peak value (which do not strongly affect the average) to be considered permissible. This is true of all of the noise exposure type evaluations which are currently under consideration. Therefore it becomes apparent that for appropriate protection of the community from excessive airborne noise due to transit train operations it is necessary to establish both a maximum for the peak sound level and a maximum for the noise exposure.

For noise around stations due to automobiles and buses entering and leaving the station area, more detailed studies will be made of the station plans when it is expected that a station design will have a significant effect on increasing auto and bus noise levels in a neighborhood.

Construction Noise Control Specifications

Noise generated by the construction of the Metro system is considered to be a major to moderate short-term impact. In anticipation of this noise problem the following is

included in the WMATA Guide for Preparation of Section 2, Special Conditions (of contract documents for the construction of the various segments of the Metro system):

> "Noise Control
> (a) The Contractor shall use every effort and every means possible to minimize noises caused by his operation, which the Engineer may consider objectionable. The Contractor shall provide working machinery and equipment designed to operate with the least possible noise, and if gearing is used, such gearings shall be of a type designed to reduce noise to a minimum. Compressors shall be equipped with a filter that reduces noise on in-take lines. All gas- or oil-operated equipment shall be equipped with silencers or mufflers on exhaust lines. Wherever practicable, electricity shall be used for power to reduce noise, unless otherwise stipulated in these specifications.
>
> (c) Where required by agencies having jurisdiction, certain noise-producing work may have to be performed during other than regular working hours or only at specified periods."

Within the general provisions outlined above, more detailed noise specifications are included in the engineering contracts prepared for route segments. For example, in some cases Metro corridors have been subdivided into the following four categories according to neighborhood character.

Table 13: Typical Background Noise Levels at Night in General Area Categories along Metro Corridors

Area Category		Typical Background Noise Level at Night
I	Urban Residential	35-45 dBA
II	Semi-Residential/ Commercial	45-55
III	Commercial	Over 55
IV	Industrial/Highway Corridor	Over 60

The following noise controls and work hours have been established in each area category. The controls have varied depending on the type of equipment being used; mobile equipment creating intermittent noise has not been as closely controlled as stationary equipment creating more long-term noise in neighborhoods.

Table 14: Standards for Construction Noise by Area Category and Type of Equipment

Area Category	Structure Monitored	Mobile Day	Equipment Night	Stationary Day	Equipment Night
I	Residen.	75 dBA	60 dBA	60 dBA	60 dBA
II	"	80	65	65	55
III	"	85	70	70	60
IV	"	85	75	75	65
I	Commercial	85	85	70	70
II,III,IV	"	85	85	75	75

Table 15: Suggested Work Hours Related to Noise Area Category

Area Category	------Weekday Hours of Work-------- Day	Night
I	7:00 AM-7:00 PM	7:00 PM-7:00 AM
II, III, IV	7:00 AM-10:00 PM	10:00 PM-7:00 AM

In addition to establishing performance standards, the contractor also has been required to use approved types of noise abatement measures such as silencers on air intakes of equipment, shields or other physical barriers to restrict noise transmission, and soundproof housings or enclosures for noise producing equipment. The contracts have also prohibited the use of air or gasoline drive saws and required that noise control be taken into account in the siting of stationary equipment and the routing of construction equipment carrying spoil, concrete and other construction materials. These contracts have established a model for subsequent contracts prepared as construction progresses.

If performance is not in accordance with these contract requirements, work by the Contractor can be stopped until the condition is corrected.

All contractors employed by WMATA are required to comply with the requirements of the Federal Occupational Safety and Health Act as it applies to noise associated with Metro construction.

NEW

Design Features of Metro Which Lead to Minimum Noise and Vibration

Standard way structure and vehicle features which are used successfully to contribute to improved performance with regard to noise and vibration from the transit vehicle operations include:

continuous welded rail,

resilient rail fastenings,

concrete or composite steel-concrete girders for aerial structures,

sound absorption materials in certain tunnels and stations,

car side skirts,

lightweight trucks with minimized unsprung weight,

resilient chassis mountings,

low noise non-skid braking systems,

use of wheel and rail grinders for maintaining the wheels and rails in a smooth condition, and

noise limits in the specifications for the vehicle propulsion systems and auxilary equipment.

Special features which can be used for reduction of noise or vibration include:

sound barrier walls and

resilient supported or "floating slab" trackbeds.

In conclusion, of all the types of noise discussed, construction noise will be the most disruptive but will be short-term in nature and will be controlled by the noise standards previously outlined. After Metro is operating, the noise impact is expected to be minimal to moderate locally; vibration-induced noise and wayside noise will be minimized by floating-slab construction, continuously welded cushioned rails and the use of sound buffers.

Noise levels in transit vehicles and stations will be maintained within acceptable limits and Metro patrons will be provided with an acoustically comfortable environment.

Regionally, the Metro system should lead to a net reduction in noise levels due to the reduction in otherwise anticipated automobile traffic and its associated noises. Eventual Metro operation noise levels will be lower than those already existing in the urban traffic arteries and highways throughout the metropolitan area. A forecast of 26% fewer trip origins is anticipated with Metro than would otherwise be projected for the existing transportation. (A more detailed description of relative traffic volumes is included under Air Quality.)

NOISE LEVELS FOR SURFACE AND AERIAL STRUCTURE OPERATIONS

To provide a basis for evaluating the expected acoustic impact of WMATA Metro rail transit system train operations, levels of the expected wayside noise and vibration from the trains have been determined. The background information providing the basis for the expected performance includes noise and vibration level data obtained at the BART Test Track, at the TTC facilities, at the PATCO Lindenwold Line facilities and with BART revenue trains operating on the BART facilities. The predictions, therefore, are based on the information available from the latest advancements in technology, from data obtained from the newest systems and available information from research studies on wheel/rail noise and aerial structure noise.

In the evaluation and control of wayside noise created by steel/wheel rail rapid transit system operations, for surface and aerial way structure, the use of low sound barrier walls at the side of the way structure has been found to be an effective means for reducing wayside noise exposure due to the transit train operations. Initial evaluations made at the BART Test Track in 1965 and 1966 showed that substantial noise reductions, in the range of 9 to 12 dBA, can be achieved with sound barrier walls. Recent testing with BART revenue trains on the revenue structure showed noise reductions of 6 to 9 dBA. The predictions, therefore, include determination of the expected wayside noise level performance with the inclusion of sound barrier walls as part of the transit system facilities.

The predictions of wayside noise levels to be expected from the Metro transit trains take into account the vehicle characteristics such as length, weight, type of propulsion system, type of braking system, and other features which can affect the wayside noise. It has been assumed that solid wheels with either steel or aluminum hubs will be used and that the maximum operational speed of the vehicles will be 75 mph.

For surface ballast and tie track installations, one of the most important design features of the WMATA Metro system, which contributes to quieter operation than may be expected based on previous experience with steel wheel/rail systems, is the use of continuous welded rail. With the continuous

welded rail eliminating the rail joints, which are one of the major sources of noise in a steel wheel/rail system, and considering all of the features included on the transit cars for noise reduction, the overall result is a considerably lower wayside noise level than for older systems which have noisier or jointed rail and which have vehicle equipment that generates higher noise levels.

Figure D-1 indicates the expected wayside noise as a function of speed for WMATA Metro trains as observed 50 ft from track centerline. The data on the chart is for operations of the vehicles using rail and wheels which are maintained in a smooth condition using rail and wheel grinding equipment. Experience with the BART equipment indicates that the 2 dBA range shown on the chart is the normal variation in performance which can be expected from the transit trains with normal maintenance of the wheels and rails.

One of the noisiest modes of operation of rail rapid transit systems in the past has been operation on elevated or aerial structures. The lightweight steel structures of the Chicago and New York elevated, with direct or rigidly attached rail produce very intense noise due to mechanical vibration of the structure as the transit trains pass by. This noise has resulted in considerable impact on the neighboring areas and buildings and is one of the factors which has resulted in the general public view that rail rapid transit systems are noisy. The noise generated by the steel aerial structure also results in high noise levels in the transit car, decreasing the quality of the environment presented to the transit system patrons.

For many years it has been known that concrete decks and all-concrete aerial structure girders result in much less structure radiated wayside noise and in-car noise for aerial structure operations and on many occasions there have been recommendations that the old steel structures be replaced with concrete structures or at least have concrete decks added. Economic considerations have always ruled out these changes. With the construction of new systems such as BART and WMATA Metro the opportunity for use of all-concrete structures is presented and these systems are using primarily all-concrete aerial structure girders.

At the BART facilities the use of concrete aerial structures with resilient direct fixation rail fasteners has been demonstrated to be very effective in reducing wayside and in-car noise. The noise radiated by the mechanical vibration of the concrete aerial structure is less than the noise radiated by the car and the noise produced during aerial structure operations is primarily due to the characteristics of the car. The concrete structure is so effective, in fact, that it is possible to use a sound barrier wall for further

reduction of the wayside noise since the noise is primarily radiated from the transit car and rail. With a sound barrier wall it is possible to reduce the wayside noise to levels 9 to 12 dBA less than the levels produced by the car alone, thus further reducing the impact of aerial structure operations on the neighboring communities [without significant effect on the car interior noise].

With a concrete aerial structure there is a small increase in the wayside and in-car noise compared to ballast and tie operations, however, this increase is primarily due to the sound reflective characteristics of the concrete trackbed compared to the absorptive characteristics of the ballast and tie trackbed. The wayside noise for operation on an all-concrete aerial structure is only 2 to 4 dB greater than for operation on ballast and tie tracks. Similarly, the in-car noise is about 3 dBA greater on concrete aerial structure than for ballast and tie tracks. These higher noise levels on the concrete aerial structure are primarily due to the reflection of the middle frequency range sound from the concrete trackbed and are not due to mechanical vibration of the aerial structure.

In contrast to this performance of the all-concrete aerial structure it is typical for the noise radiated by a steel aerial structure, for systems such as the Chicago Transit Authority, to cause the car interior noise to be 8 to 10 dBA greater for aerial structure operations compared to ballast and tie operations. In fact, in Chicago it is found that the car interior noise levels for aerial structure operations are essentially the same as for operation in the highly reverberant round tunnels - indicating very intense noise levels under the car on the elevated structure due to noise radiated by structural vibration.

With steel aerial structures the noise radiated from the structure is greater than the noise from the transit cars and wayside sound levels of 100 to 110 dBA are typical at distances of about 50 ft from the track centerline. With a concrete aerial structure, levels of 80 to 88 dBA at 50 ft are typical for even higher speed operation than is characteristic of the systems using steel aerial structures. With sound barrier walls the levels can be further reduced to the range of 70 to 78 dBA at 50 ft for concrete aerial structures whereas the noise from a steel structure cannot be reduced at all with a simple sound barrier.

The noise level data obtained with prototype BART cars and the data obtained at the BART Test Track, including the information on aerial structure noise due to vibration induced by the transit cars, has provided a basis for determining wayside noise to be expected from Metro trains operating on aerial structures. Figure D-2 indicates the

expected wayside noise level at 50 ft from track centerline as a function of train speed for Metro trains operating on aerial structure. In deriving the noise level indicated on Figure D-2 the data from the BART trains have been adjusted for the type of all-concrete aerial structure girder construction that is to be used on the WMATA Metro system.

As with the ballast and tie track wayside noise, the continuous welded and ground rail is of considerable benefit in reducing the wayside noise expected from the aerial structure. Further, where the trackbed is concrete as on an aerial structure, the use of resilient direct fixation rail fasteners of the same type as used in subways contributes to the lowering of vibration and noise levels. These rail fasteners are to be used on the Metro aerial structures. In airborne noise sensitive areas where a composite steel concrete aerial structure girder must be used because of the requirements for span length, the steel girder webs will be damped to give performance comparable to that from all-concrete aerial structure girders. Even with damping, however, the use of composite girders will result in slightly greater low frequency rumble than for the all-concrete girders.

To derive the impact for the community noise exposure from the wayside noise level data given on Figures D-1 and D-2 it is necessary to provide information on the decrease of the noise level with distance away from the track centerline. Figure D-3 indicates the maximum wayside noise levels as a function of distance from track centerline for locations perpendicular to the center of the train as the train passes by, assuming open level terrain. The chart is plotted in a manner to give a correction factor to be applied to the lvels on Figures D-1 and D-2 for different distances from track centerline and for different lengths of trains.

The curves of decreasing sound level with distance on Figure D-3 are for application to both aerial structure and at-grade operations in open terrain. If there are rows of buildings along the transit structure alignment, the sound levels at large distances from the track may be somewhat less than given by Figure D-3. For an aerial structure or elevated earth berm with ballast and tie track Figure D-3 is approximately correct, however, for at-grade ballast and tie track the sound level beyond the first row of buildings or first row of houses will be 10 to 15 dBA less than indicated on the chart because of the shadowing effect created by the buildings. This shadowing effect is only present when the sound waves from the transit train are directly shadowed by intervening buildings and only the first row of buildings provides any noise reduction. The subsequent rows of buildings or homes do not create any additional or additive noise reduction beyond that created by the first row of shadowing buildings.

A basic and effective procedure available for abatement of the transit system wayside noise in critical areas is the use of a sound barrier wall such as that shown on Figure D-4 for an aerial structure installation on the WMATA Metro concrete aerial structure. A low sound barrier or shadow wall located at the side of the way structure is in an ideal location to shield all of the sound sources present on a transit car and, thus, can be used as a very effective means of providing extra sound abatement in critical areas. All of the noise generated by a transit car in operation originates in the area beneath the car. The main sources are the noise radiated by vibration of the wheels and rails due to wheel/rail interaction and the noise radiated by the propulsion system. The auxiliary equipment and vibration of other undercar components also contribute to the noise, but aerodynamic noise and vibration of the upper parts of the car body do not contribute significantly to the wayside noise. Therefore, a sound barrier wall shielding or shadowing the noise from beneath the car is a very effective noise abatement technique.

Figure D-4 indicates the sound barrier wall configuration which has been determined to be appropriate for the WMATA Metro aerial structures. One of the most important features of the barrier wall design is the height of the wall relative to the transit car wheels and side skirt. Another important feature is that the wall must have no holes or slots which would allow transmission of sound through the wall. Also, on aerial structures the provision of sound absorbing material, as shown on Figure D-4, will improve the efficiency of the wall as a noise reduction element.

For ballast and tie installations the sound barrier walls can be constructed in a variety of configurations. The basic requirement is the provision of a solid wall with sufficient height to shadow the noise transmitted from the transit trains to the wayside. No sound absorption is necessary on a ballast and tie track sound barrier wall for full effectiveness because of the sound absorption provided by the ballast. For example, a retaining wall which extends above the top-of-rail elevation or an earth berm or earth cut which extends above the top-of-rail will serve as wayside sound barrier for reducing the wayside noise level from operations on surface ballast and tie tracks.

Figures D-1 and D-2 include the expected wayside noise level as a function of speed for operations on the ballast and tie track and aerial structure, respectively, with sound barrier wall in place. Figure D-2 for the sound barrier wall on aerial structure indicates the results expected with non-absorptive barrier wall and with absorptive barrier wall. The sound barrier wall with absorption can be used in the most critical areas but for most areas the sound barrier without absorption will give adequate noise reduction to give satisfactory results.

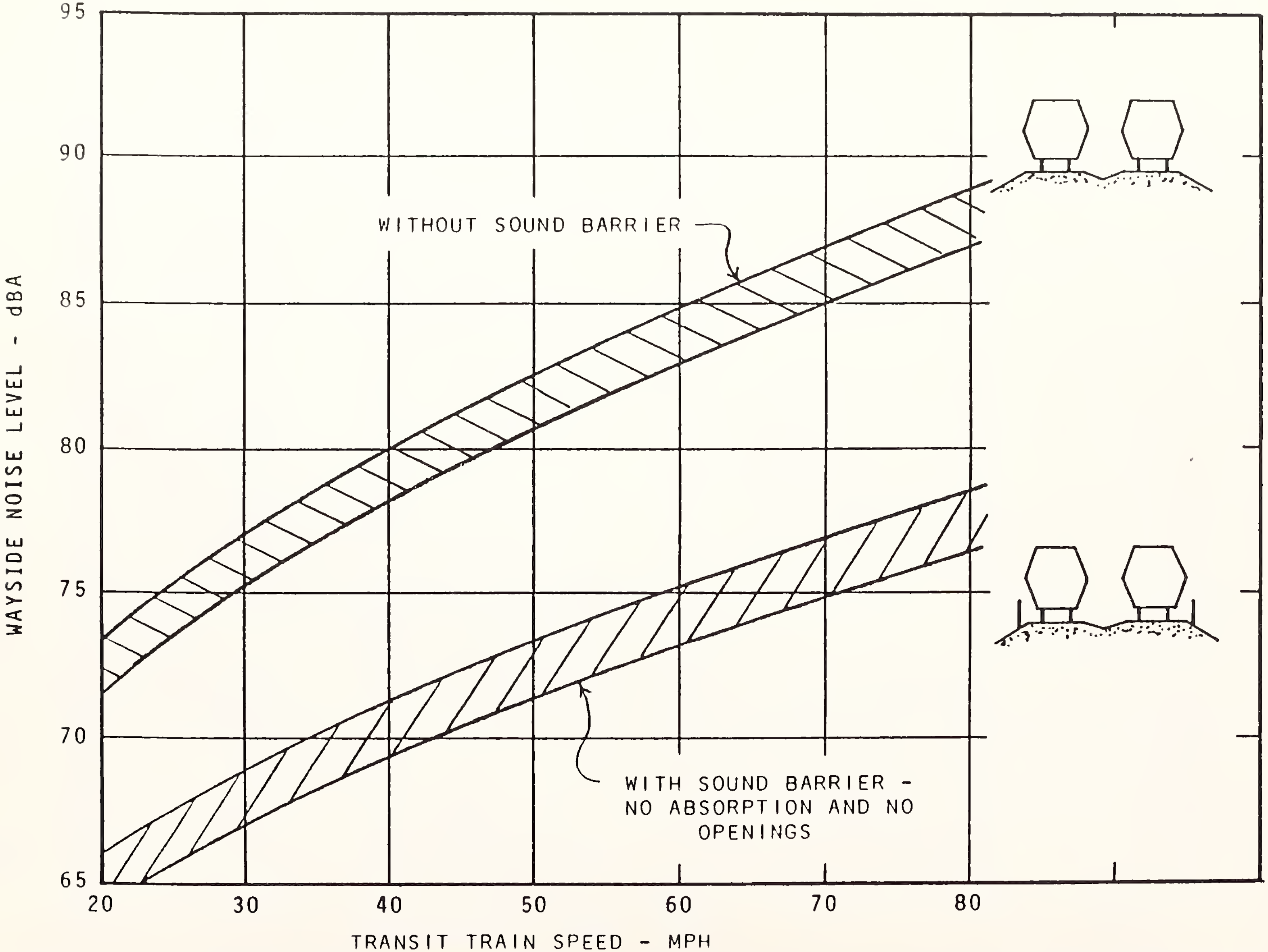


FIGURE D-1 MAXIMUM WAYSIDE PASSBY NOISE LEVELS EXPECTED AT 50 FT FROM TRACK CENTERLINE FOR 8-CAR METRO TRAINS OPERATING ON BALLAST AND TIE TRACK

NEW

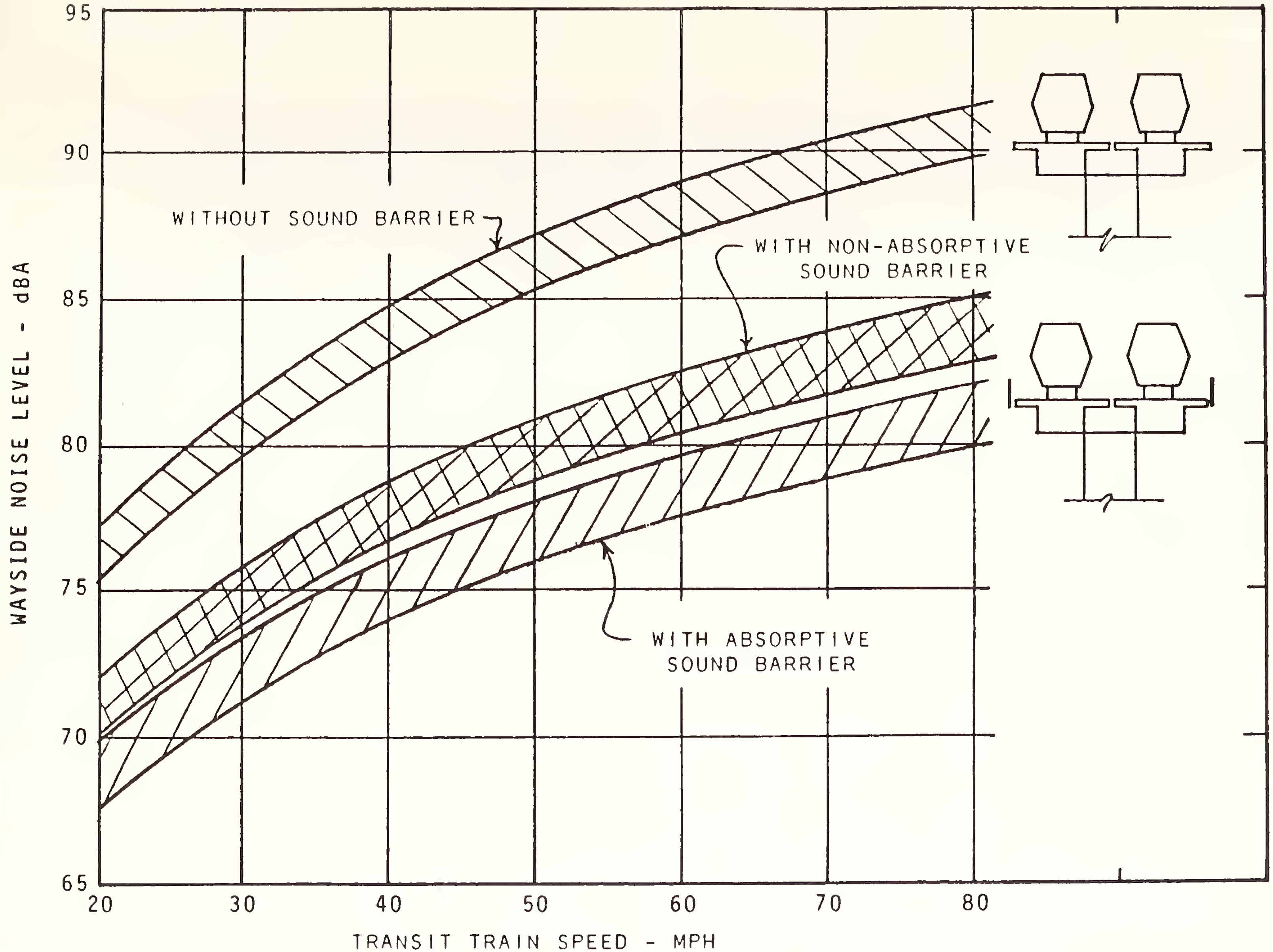


FIGURE D-2 MAXIMUM WAYSIDE PASSBY NOISE LEVELS EXPECTED AT 50 FT FROM TRACK CENTERLINE FOR 8-CAR METRO TRAINS OPERATING ON CONCRETE AERIAL STRUCTURE WITH AND WITHOUT SOUND BARRIER WALLS

NEW

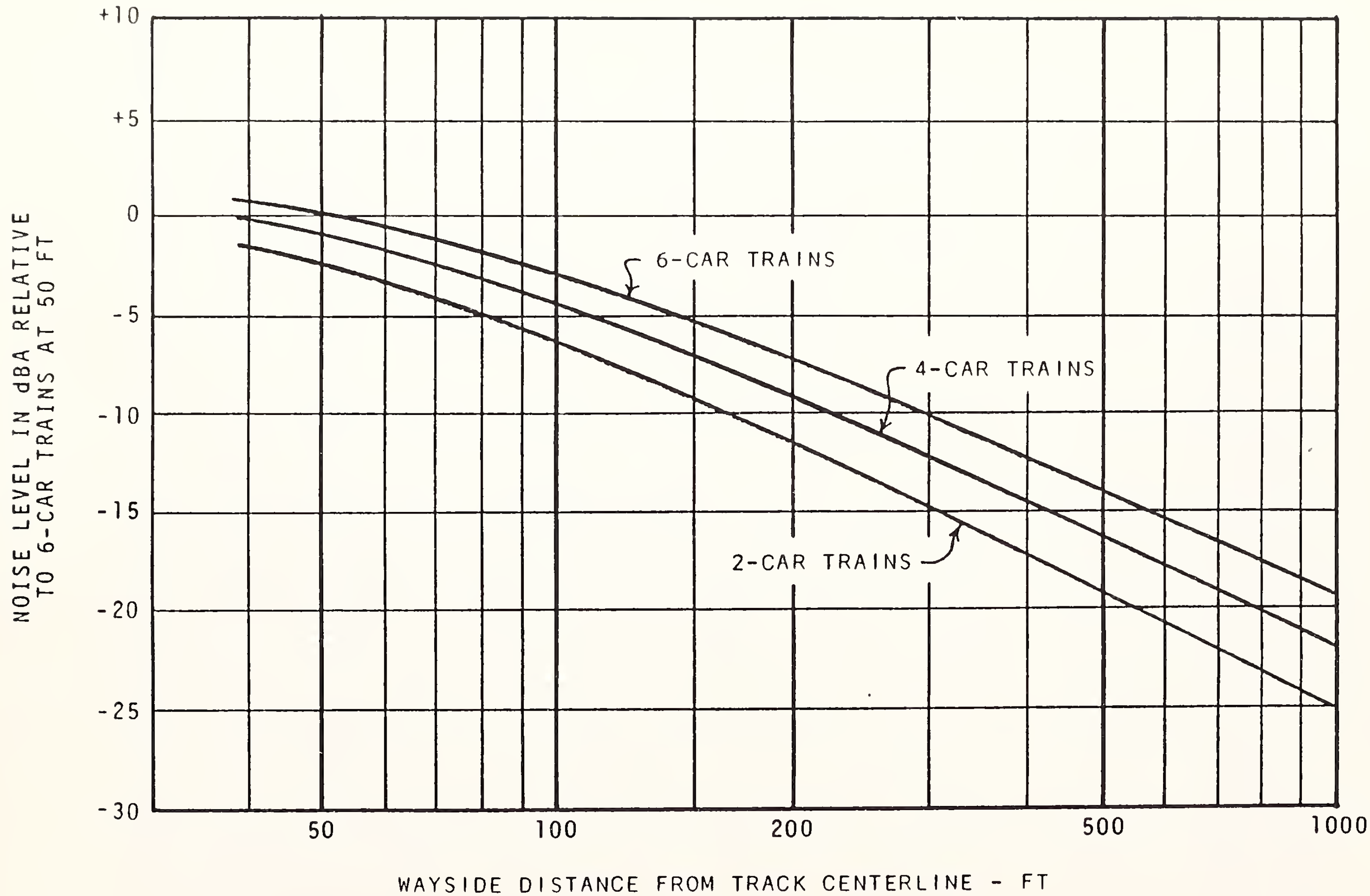


FIGURE D-3 MAXIMUM WAYSIDE NOISE LEVELS AS A FUNCTION OF DISTANCE FROM TRACK CENTERLINE FOR OPEN LEVEL TERRAIN - METRO TRANSIT TRAINS OPERATING ON AERIAL STRUCTURE OR BALLAST AND TIE TRACK

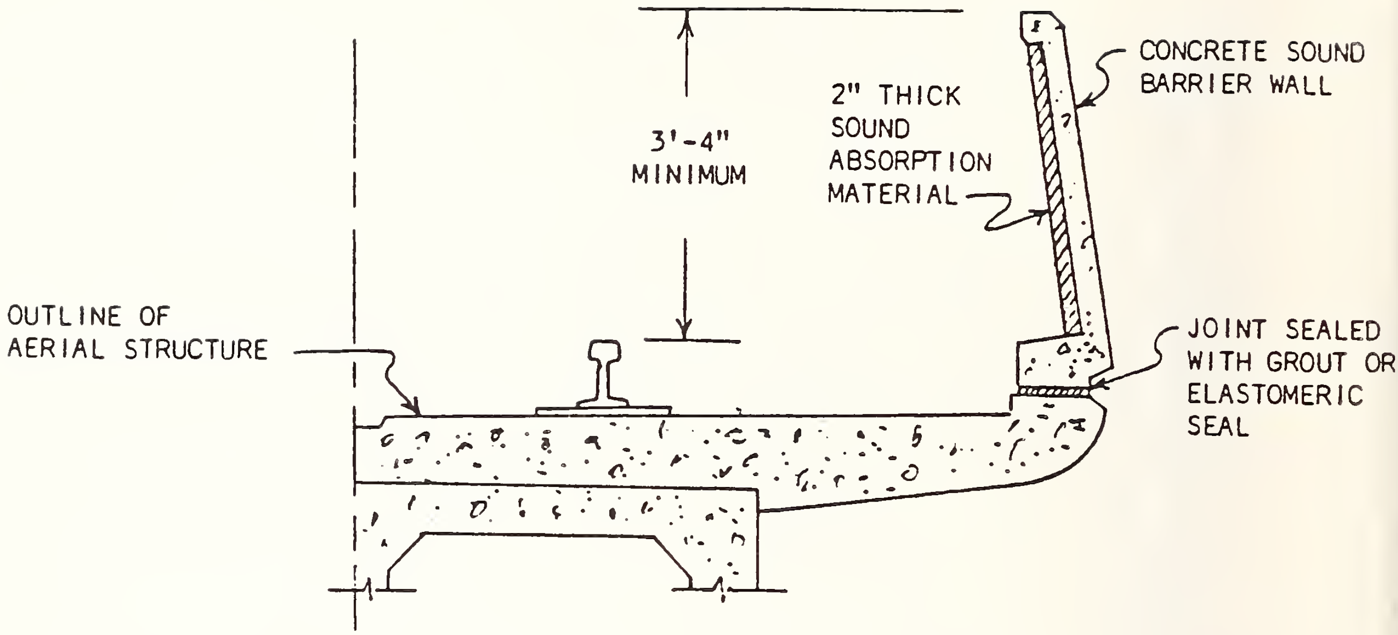


FIGURE D-4 SOUND BARRIER WALL DESIGN USED ON WMATA METRO AERIAL STRUCTURES

One of the impacts associated with a rail rapid transit system project is the short-term noise and vibration impact of construction activities. As with any large project, the construction of a rapid transit system involves the use of machines and procedures which, in the past, have resulted in intense noise levels and, occasionally, high vibration levels in and around the construction site. The Metro transit system way structures include subway, at-grade and aerial structure configurations. The construction activities will include demolition, clearing, grading, excavating, pile driving, drilling, materials handling and placement, erection and finish work and will involve the use of all the various kinds of machines and procedures which are associated with these activities. It is also possible that blasting will be used for excavation and tunneling in rock.

In recent years considerable progress has been made in the reduction and control of construction noise through modifications of the equipment to reduce noise generated at the source, through modifications of construction procedures and by selection of those construction procedure alternates which are less noisy. Also, in many areas and for many types of construction projects there have been noise limits or noise standards included in the construction contracts or applied by governmental agencies in order to limit the noise impact from the construction. These efforts at reducing construction noise have produced considerable success and with new construction projects the work can be and is accomplished with considerably less noise impact than is traditionally expected.

The three general configurations of transit way structures, subway, aerial and at-grade have different construction techniques involved and, hence, produce somewhat different noise and vibration.

For at-grade construction the impact will be due to demolition; clearing and grading; placement of materials, including any retaining walls and the ballast and ties and track; plus any finishing activities such as fencing and landscaping.

For the aerial structure configuration the activities will include demolition; ground clearing and grading; erection of foundations including, possibly, pile driving; construction of the aerial structure columns; erection of girders and the finishing.

For subway construction the acoustical impacts can be of two different characters. In the areas where tunneling is used the only impact due to the construction activities [except at access shafts] will be the ground-borne vibration due to the excavation process, either the tunnel boring machine or blasting. Also, there may be some ground-borne vibration due to the vehicles used to remove material. For cut-and-cover subway there will be impacts due to ground clearing, excavation, erection and finishing activities.

Construction Equipment Noise Levels

There is considerable information available on the typical noise levels created by modern construction equipment and there is a growing body of information on lower noise levels which can be achieved with modified equipment or equipment which is designed with noise reduction and control as one of the design parameters.

Measurements made at transit system construction project sites provide the best information relative to expected noise levels from the type of construction activities which will be associated with the Metro system. Table F-1 presents a series of noise levels observed for various types of machines and activities associated with the WMATA Metro construction project. These data are for construction activities using standard present day equipment without noise control or noise reduction modifications to the equipment. The data was obtained before noise restrictions and limits had been applied to the construction activities on the Metro project.

Typical noise levels at construction sites, as indicated by Table F-1, do result in substantial acoustic impact on neighboring communities and in new and future projects such noise levels are considered unacceptable. There are many techniques available for reducing the noise, some of which involve little or no cost and some of which involve considerable cost. In some instances modifications of procedures or use of different procedures and equipment can result in much lower noise levels and impact. For the Metro project one of the procedures, a very effective procedure, has been to include noise limit specifications in the construction contracts in order to reduce or limit acoustic impact due to construction activities.

Ground-Borne Vibration from Construction

Because of the nature of some construction activities, high amplitudes of ground-borne vibration may result in some impact in neighboring community areas. Blasting and impact

pile driving are two types of activities traditionally associated with high levels of ground-borne vibration. It is also possible that some types of heavy vehicles and excavation activities can generate sufficient ground-borne vibration levels to be perceptible or noticeable in nearby buildings.

The vibration levels created by the normal movement of vehicles including graders, loaders, dozers, scrapers and trucks generally are of the same order of magnitude as the ground-borne vibration created by heavy vehicles running on streets and highways. Large trucks and buses operating on city streets and on highways generate ground-borne vibration due to wheel/roadway interaction and particularly high vibration levels can be associated with truck and bus operations on rough or pock-marked streets. In general, the ground-borne vibration from vehicle operations on streets, even very rough streets, is not sufficient to create noticeable impact on adjacent community areas. This vibration is of a level that is generally imperceptible or barely perceptible and is considered acceptable, producing little or no impact. Thus, it can be expected that the normal vehicle activities at the construction sites will not generate sufficient ground-borne vibration to result in significant impact.

Blasting, drilling and excavation procedures for cut-and-cover subways can result in ground-borne vibration levels which are perceptible or noticeable in adjacent community areas. The amplitudes of vibration from such activities are limited for safety reasons by procedural techniques. For example, through the use of time delay charges in blasting the maximum amplitude of the ground-borne vibration is limited to a level well below the criteria for structural damage to adjacent facilities. Impact pile drivers, which create considerable noise and vibration, also produce vibration levels which are well below the intensity required for structural damage to adjacent buildings and other facilities.

Tunnel boring machines also create ground-borne vibration, however, experience to date indicates that the vibration from the use of such machines is considerably less in intensity than that from blasting or pile driving and that is not significantly greater than the vibration created by heavy trucks traveling on city streets. The ground-borne vibration levels from a boring machine are probably intermediate between the ground-borne vibration levels created by operations of transit trains and the operations of mainline railroad vehicles and may, therefore, produce some short-term impact.

Construction Noise Specifications

There are numerous procedures available for reducing the noise generated by construction equipment and activities. One of the most effective methods of assuring controlled noise and minimum acoustic impact is the inclusion of noise limit specifications in the construction contract documents. Recent construction projects of the New York City Transit Authority and the WMATA Metro have included noise restrictions in the contract specifications. The experience with these noise limit specifications and with the contractors working with the requirements is that considerable success in the reduction of construction noise has been realized.

For each design section of the Metro system the construction contracts will include a section on noise limits. In many instances noise standards or limitations applied to construction or other noisy type activities have been based on average conditions in a community or, alternatively, on the most severe or critical conditions. The noise limit law or standard has then been written with one set of restrictions which apply to every area. This procedure is not consistent with best economy or best benefit to the community. In many instances this results in either excessive noise in quiet residential areas or excessive cost for noise reduction in commercial or industrial areas where there is no benefit to be gained from the noise reduction. The noise limitation specifications for the Metro have four different levels of noise limitations which are applied consistent with the type of community area in which the construction takes place.

Table F-2 indicates noise level limitations excerpted from the WMATA Metro construction contract documents to provide an indication of the degree of noise impact which can be expected from the Metro system construction activities.

TABLE F-1 TYPICAL NOISE LEVELS OBSERVED AT RAIL TRANSIT SYSTEM CONSTRUCTION PROJECTS

Equipment or Process	Distance	Noise Levels
Air Hammer Cutting Concrete	50 ft	85-90 dBA
Crane & Pile Drilling Rig	50	
Moving Drill		90
Emptying Auger		86
Idling		82
Drilling		83-88
Placing Pile		74
Setting Pile		88
Concrete Mix Truck Placing Concrete	50	81-85
Diesel Hammer Pile Driver	24	95-106
Compressor	24	83-90
Hydraulic Cranes	24	88-90
Derrick Crane	50	88
Tamper	50	88
Scraper	50	88
Rock Drill	50	98
Trucks	50	85-91
Paver	50	89

TABLE F-2 CONSTRUCTION NOISE SPECIFICATIONS

Noise Restrictions at Affected Structures

Sound levels for noise due to construction activities will be monitored at the building line of structures affected acoustically by the Contractor's equipment operations and plant. The Contractor shall conduct the construction activities in such a manner as to not exceed the maximum noise levels at the building line of the affected buildings according to the following schedule.

AT RESIDENTIAL STRUCTURES:

Mobile Equipment

Sound levels for nonscheduled, intermittent, short-term noise from mobile equipment shall not exceed the following:*

	Type II Residential Areas	Type III Residential Areas	Type IV Commercial Areas
Daily, except Sundays and Legal Holidays 7:00 A.M. to 7:00 P.M.	75 dBA	80 dBA	85 dBA
Daily, except Sundays and Legal Holidays 7:00 P.M. to 7:00 A.M.	60 dBA	65 dBA	70 dBA
7:00 P.M. Saturday to 7:00 A.M. Monday and Legal Holidays	60 dBA	65 dBA	70 dBA

Stationary Equipment

Sound level limits for repetitively scheduled and relatively long-term noise from stationary equipment shall not exceed the following:*

	Type II Residential Areas	Type III Residential Areas	Type IV Commercial Areas
Daily, except Sundays and Legal Holidays 7:00 A.M. to 7:00 P.M.	60 dBA	65 dBA	70 dBA
Daily, except Sundays and Legal Holidays 7:00 P.M. to 7:00 A.M.	50 dBA	55 dBA	60 dBA
7:00 P.M. Saturday to 7:00 A.M. Monday and Legal Holidays	50 dBA	55 dBA	60 dBA

AT BUSINESS-COMMERCIAL STRUCTURES:

Mobile Equipment

Sound levels for nonscheduled, intermitted, short-term noise from mobile equipment shall not exceed the following:*

Daily, including Sundays and Legal Holidays, all hours, maximum of 85 dBA.

Stationary Equipment

Sound level limits for repetitively scheduled and relatively long-term noise from stationary equipment shall not exceed the following:*

Daily, including Sundays and Legal Holidays, all hours, maximum of 75 dBA.

* To minimize the effect of reflected sound waves at buildings, measurements may be taken 3 to 6 feet in front of the building face.

Spoil Disposal[1]

Disposal of spoils from Metro construction is a major concern environmentally for the region as well as economically for WMATA. It is estimated that approximately 18 million cubic yards of spoil material will be

[1] More detailed information concerning the proposed spoils disposal sites indicated on Map 3 is presented in Appendix C of this report, the geology and Watersheds study.

excavated during the construction of the Metro system. Most of this material will be clean soil and rock intermixed with small amounts of building rubble.

Because of the difficulty in finding suitable sites for spoil disposal, the environmental concern over spoil dumping and the rising costs of hauling and dumping spoils, WMATA is attempting to limit the amount of excess spoil produced. Whenever feasible, the excavated material from underground installations will be used for those portions of Metro to be constructed on fill. The quality of excavated materials and their proximity to fill sites will determine the degree to which cuts and fills can be balanced.

It is estimated that over 60 percent or 10 million of the total 18 million cubic yards of spoil material will be used as backfill, leaving approximately 8 million cubic yards of spoils to be disposed. Considering that 47 miles of the 98.02 mile Metro system will be underground, this is a substantial amount of backfill.

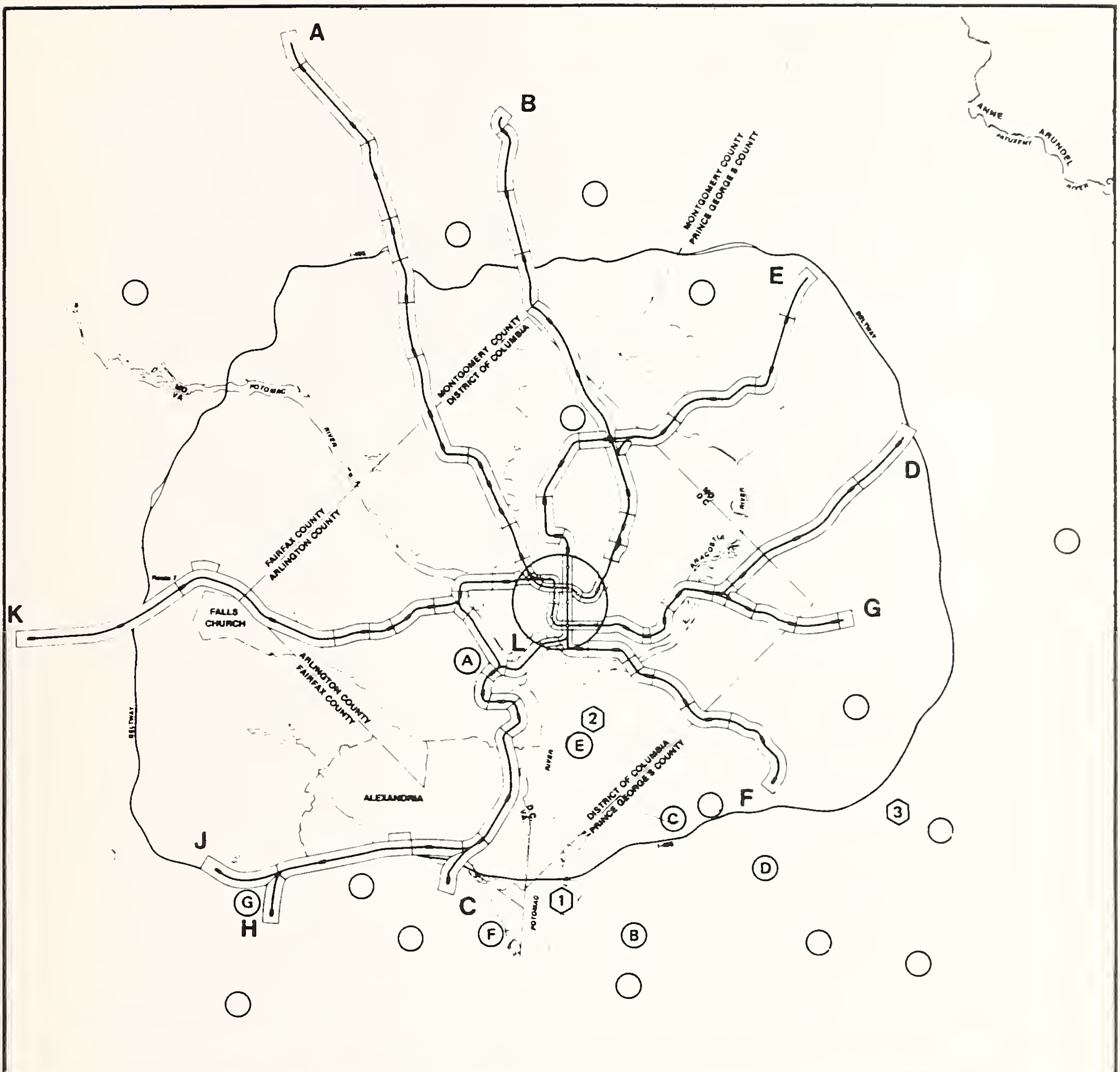
The table on excess spoils illustrates that the greatest volume of excess spoils will be produced by the A, B, C and E Routes, which involve extensive tunneling and cut-and-cover construction. These four routes account for over half of the total excess spoils to be produced by the entire system.

Excess Spoils by Metro Route

Route	Cubic Yards of Spoils
A - Rockville	1,921,000
B - Glenmont	1,086,000
C - Huntington	1,010,000
D - New Carrollton	890,000
E - Greenbelt Road	1,064,000
F - Branch	900,000
G - Addison	459,000
H - Franconia	Negligible
J - Springfield	33,000
K - Vienna	573,000
L - L'Enfant-Pentagon	129,000
Total Metro System	8,095,000

Source: WMATA, 10/72

The excess spoils from Metro present both problems and opportunities. Land up-graded for development through the use of the high quality spoils produced by Metro can be of considerable value to the region where sites suitable for development are becoming more scarce. The region is growing rapidly outward, avoiding some sites in urbanized areas presently unsuitable for development. By using spoils to create developable land in areas already served by roads and public



Existing major spoil dumping sites * **

Possible major spoil areas in the future

* Source: Urban Pathfinders, Inc.

** Lettered sites discussed in text

Map 3

General Locations of Spoil Dumping Sites

utilities, urban land resources can be used more intensively. Manhattan, Back Bay Boston and San Francisco have used spoil material in this manner. Outstanding parks and recreation areas, such as the Washington Mall and Golden Gate Park in San Francisco have been created out of man-made soils. Spoil disposal areas in the region are illustrated on the accompanying map. A shopping center was built on the fill deposited at Site E in Springfield, Virginia. The fill at Bolling Air Force Base is being used to raise the grades in those areas which are subject to periodic flooding. Housing will be built here when the fill operation is completed. Thus, if good disposal sites are selected and proper techniques are used in spoiling activities, the potential negative impacts of spoil disposal can be minimized and spoil used to benefit the entire region.

There are, however, three basic problems related to spoils disposal:

- Pollution problems resulting from erosion and sedimentation;
- Transportation problems due to traffic congestion at the construction and dumping sites; and
- Shortage of suitable spoil disposal sites.

The first two of these problems are predominantly short-term in nature and the third has long-term implications.

The extent of WMATA's control over these problems varies. WMATA requires the hauling contractor to provide for the removal and disposal of spoil resulting from the construction process. The contractor is required to obtain all necessary permits and uphold all appropriate ordinances with respect to the performance of his operations within specific jurisdictions. Most jurisdictions review proposed spoiling activities before granting permits. Maryland, for example, requires detailed spoil disposal plans. In addition, special permits are required by such agencies as the National Park Service when its properties are involved. The enforcement of the environmental provisions of these permits and ordinances is carried out by the jurisdiction or agency which grants the permit. Due to the great diversity of regulations among the jurisdictions or agencies in the region concerning spoil disposal and because of the limitations on WMATA's legal jurisdiction, enforcement of local ordinances is left to local authorities rather than assumed by WMATA.

The pollution problem created by spoils from Metro excavations is primarily one of erosion and sedimentation. WMATA, in its <u>Guide for Preparation of Section 2, Special Conditions</u>, forbids contractors in the execution of their work to allow any waste or erosion material to enter natural or man-made drainage or sewer systems. These contract provisions, discussed in more detail under

Sediment Control, mitigate pollution problems at Metro construction sites and during spoil transport, but do not apply to spoils after disposal at dumping sites. This latter concern falls under the jurisdiction of local ordinances. Sites A, B and C are those which would need control to prevent runoff and siltation associated with the spoiling activities from entering adjacent creeks. Techniques applicable to these sites are also discussed under Sediment Control.

The physical transportation of spoils material creates problems of traffic congestion. Many of the existing spoil disposal sites can be reached only by local and secondary streets. Most spoil carriers are ten wheel trucks, the weight of which can break up the pavements of the smaller streets. Spillage from the trucks is a minor annoyance along the route from the construction site to a dumping area and back, and creates problems for local vehicular traffic. Also, the noise from these trucks can be quite disturbing to some adjacent land uses, e.g., housing, schools, hospitals, parks, etc. For example, dumping sites A and B are located in areas of single-family suburban housing. The traffic and noise from dumping operations at these sites could be disturbing to the people who live in the vicinity.

WMATA has anticipated these problems. The following is excerpted from the Guide for Preparation of Section 2, Special Conditions:

> "Article 2.50 Pollution Abatement
> (1) Material Transport: trucks leaving the site and entering paved public streets shall be cleaned of mud and dirt clinging to the body and wheels of the vehicles. Trucks arriving and leaving the site with materials shall be loaded in a manner which will prevent dropping of materials or debris on the streets. The Contractor shall maintain a suitable vehicle cleaning installation and inspection installation with permanent crew for this purpose. Spills of materials in public areas shall be removed immediately at the Contractor's Expense."

Noise associated with spoil dumping trucks is also provided for in WMATA contract specifications, which require the Contractor to use equipment designed to operate with the least possible noise.

Pavement deterioration, interference with local traffic patterns, and noise interference can be minimized by selecting spoil sites in areas which are isolated from incompatible adjacent land uses (e.g., housing) and reached by major, heavy duty roads. Such a site in

current use is the dumping area within Bolling Air Force Base (Site D). A dumping site under consideration, but not yet approved by the State of Maryland, is Smoot's Cove in the Potomac River south of the intersection of I-295 and I-495 (Site 1). If permission is granted to dump in the Cove, the owners propose to install an access road directly to the Cove from the I-495 and I-295 intersection to facilitate easy access. Smoot's Cove was dredged several decades ago. Fill could return the shoreline in this area to its former location. This site is capable of receiving 10 million cubic yards of spoil over an eight-year period. There are potential problems associated with sedimentation of the Potomac, obstruction of the stream channel, and the marsh becoming quick.

It is estimated that with proper enforcement or WMATA contract provisions and with careful selection of disposal areas, most of the short-term negative impacts due to the excavation and transportation of spoils and the mingling of clean and unclean fill can be minimized. Local ordinances and their enforcement, however, warrant concern, for they vary widely with respect to their protection of environmental resources that could be endangered by spoils dumping.

The shortage of suitable disposal sites is a long-term problem related to spoils. Approximately two million cubic yards of spoils are generated annually in the Washington metropolitan area. Metro spoils will substantially increase this figure over the next decade. Dumping sites are getting more scarce and trucks must travel further into the countryside to find suitable sites. Currently, there are approximately 21 major spoil disposal sites in the region. There are three sites in Virginia and in Montgomery County, Maryland, two in Washington, D.C., and the remainder in Prince George's County. Most of the sites in Prince George's County are located along Maryland routes 4 and 210. All of these major sites are programmed to be filled within the next 24 months.

New sites will be found for Metro spoil material and care will be taken to avoid negative environmental impacts and to locate disposal sites in areas where the land created can be of maximum benefit.

Sediment Control[1]

One of the major environmental concerns which must be dealt with in connection with the above grade construction and maintenance of the Metro system is that of erosion and sedimentation. Any disturbance of the existing land cover, whether it is vegetation, paving or a structure, will expose the soil surface to erosion. Damage due to erosion and sedimentation is usually most

[1]Additional information concerning sediment control is presented in Appendix C of Report, the Geology and Watershed Study.

acute during construction and has both long and short-term implications.

Erosion from spoil storage and dumping areas and from vegetated land, particularly on slopes, is a potential negative impact if not properly controlled. Under construction conditions, rates of sedimentation may increase as much as 100 times without application of measures for run-off and erosion control. (For example, the estimated sediment yield from highway construction is 300 tons/linear mile/year from two-lane highways). Adequate control of sedimentation is related to the rate of storm water run-off. Water running over unprotected land in downstream channels moves sod materials in proportion to the water's volume and velocity. Deposition of sediment occurs as the water slows down or spreads out. In urban areas, most sediment eventually flows into the storm drainage system. In more rural areas, sedimentation affects water courses.

Large quantities of sediment introduced into streams previously carrying small quantities of suspended materials usually produces a variety of changes in the physical and biological characteristics of stream channels. These changes include: the deposition of channel bars, the erosion of channel banks as a result of deposition within the channel, obstruction of flow and a concomitant increase in flooding, shifting configurations of the channel bottoms, smothering of bottom dwelling aquatic life, alteration of the flora and fauna because of changes in light transmission and the abrasive effects of the suspended sediment, and alteration of the species of fish as a result of changes in the aquatic vegetation and animal forms on which the fish depend.

From the causes of erosion and deposition come the technical principles of an erosion and sediment control program. They include:

- Reducing the area and/or duration of exposure of soils;
- Covering soils with mulch or vegetation;
- Mechanically retarding the rate of run-off water; and
- Trapping the sediment in the run-off water.

Basic requirements of an effective sediment control program on building sites include:

- Saving natural vegetation wherever possible;
- Avoiding unnecessary disturbance of the soil (only the smallest practicable area should be exposed at any one time during development);
- Installing permanent storm drains, roads and parking lots as early as possible;
- Planting temporary vegetation on denuded soils;
- Installing permanent vegetation speedily after construction;

- Constructing basins to trap sediment on-site. These may be of various types: debris basins, desilting basins or silt traps;
- Engineering to take care of the marked increase in water run-off that follows development;
- Timing the exposure of bare soil to the minimum;
- Fitting the development plan to the topography and soil so as to create the least erosion potential.

The following, excerpted from the WMATA Guide for Preparation of Section 2, General Conditions, concerns itself with erosion and sediment control:

> "Pollution Abatement
> (a) The Contractor shall conduct his operations in a manner to minimize pollution of the environment surrounding the area of work by every means possible. Specific controls shall be applied as follows:
>
> (2) Waste Materials: No waste or erosion materials shall be allowed to enter natural or man-made water or sewage removal systems. Erosion materials from excavations, borrow areas, or stockpiled fill shall be contained within the work area. The Contractor shall develop methods for control of waste and erosion which shall include such means as filtration, settlement, and manual removal to satisfy the above requirements."

All WMATA contractors are required to meet these provisions. In addition, they must comply with the erosion and sedimentation ordinances in the jurisdictions through which the proposed Metro routes run. Washington, D.C., the states of Maryland and Virginia, as well as most of their constituent counties, have enacted ordinances which usually require that erosion control plans be submitted and approved prior to development, and that construction sites be inspected periodically to insure compliance. Soil Conservation Service regulations will also be in effect. For example, along the Maryland routes Metro contractors will be required to apply the following erosion control methods used during highway construction:

- Constructing berms on the top of embankments and taking water down in paved downspouts;
- Providing sediment traps before and after every culvert and excavating silt collected;

Constructing temporary sediment basins in staging areas, parking lots and other areas which eventually will have storm drainage systems when construction is complete.

Enforcement of erosion and sedimentation control ordinances and WMATA contract provisions should result in adequate control over negative impacts due to Metro. It should be realized, however, that a completely effective sediment control program, including temporary land treatment and planting of ground cover, construction of silting basins, and use of earth and brush dikes, could be expensive in terms of time and money. Optimally, an amelioration of the impacts will be achieved by trying to prevent erosion at the source. Only coarser particles can be fairly effectively trapped in silting ponds unless long residence times are allowed for sediment-laden water. Thus, despite control measures that fulfill the requirements of state and local ordinances and WMATA contracts, some sedimentation could still occur. Its significance will be limited and dependent upon the existing condition of receiving streams.

Hydrologic Effects

Impacts of a hydrologic nature which could result from the Metro system can be classified into two types: those that apply only to specific sites and those that relate in general to the streams and floodplains traversed by WMATA. The more general effects are included in the following section and are illustrated with examples to give some geographic perspective. Hydrologic effects relating to sedimentation are discussed briefly here and in more detail under Sedimentation Control.

Most of the Metro route alignments avoid areas where there may be long-term impacts on the flow regimens of major streams in the region. Important hydrologic effects will be confined mainly to limited areas where Metro will require modifications to or preemption of floodplains and mechnical alterations of stream channels. For example, the J Route will cross Backlick Run four times in the vicinity of Springfield Station which is located directly on the floodplain. Portions of the floodplain will be taken and extensive rechannelization will be required with each crossing. In addition, hydrologic effects will be experienced in areas where Metro construction involves clearcutting of forest and other vegetation, and grading and paving of large areas of the floor of floodplains. The Landover and Cheverly Stations and parking areas along the D Route in Beaverdam Creek valley serve as examples of this type of construction.

[1] It should be noted that there are no coastal wetland impacts in the system as there are no coastal wetlands in the region.

Although no major damage will be done by the actual trackbeds (which are adjacent to railroad tracks), the access and parking facilities will have an impact on the natural floodplain environment and stream morphology.

Areas where Metro involves the types of construction mentioned above are limited relative to the entire 98.02 mile system. Hydrologic effects due to construction in these areas are anticipated to vary between sites. In general, there may be increased peak run-offs, higher sediment yields and lowered base flows due to the prevention of natural recharge to ground-water reservoirs beneath affected areas. Furthermore, constriction of floodplains could result in increased flood stages upstream, while higher peak discharges, stemming from preemption, could cause higher stages downstream. Culverts and bridges may further constrict the flow in stream channels during times of high flow.

Although many of these areas are presently open and relatively natural, they are either zoned for development, as in the case of Beaverdam Creek's industrial zoning, or planned for highway construction. For example, the E Route near Chillum shares the proposed I-95 right-of-way traversing the floodplain of Sligo Creek and Northwest Branch; and the K Route follows Four Mile Run along the corridor of the proposed I-66. If these presently proposed alignments are used, the most significant modifications will be due to the highways and not to Metro. In some areas, Metro shares a floodplain right-of-way with an existing freeway where stream channelization and modification of the floodplain has already occurred. An example of this situation is that of the J Route along Cameron Run where the alignment is adjacent to I-495. The City of Alexandria and the Corps of Engineers are presently planning a relocation of that relocated channel. Work appears to be much more extensive in the area of Route J than original highway channel relocation.

WMATA has no jurisdiction over local zoning. Development in conformity with zoning in most of the floodplains affected by Metro will require more extensive engineering solutions to drainage problems than those involved in Metro construction.

Many of the hydrologic effects have been anticipated by WMATA, however, and project design plans will incorporate engineering measures to control drainage. In the Metro service area, state and local ordinances require approval of either grading or drainage plans before permits are granted for building in floodplains. Standards for approval vary among jurisdictions. Some could be improved to provide better protection for natural stream and floodplain functions. The wetlands requirements of the Maryland State Department of Water Resources are exceptionally good in this respect and are discussed at the conclusion of this section. WMATA will comply with all applicable state and local ordinances dealing with flood control and drainage and in some cases WMATA's own engineering standards specify more extensive measures.

*Third paragraph expanded

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As a result, drainage and flood control problems will be minimized. Channelization, piping and flood control structures meeting the requirements of most state and local ordinances may, however, have some negative effects. While being adequate in engineering terms, these drainage and flood control methods do not protect natural stream and floodplain environments. Some desirable forms of aquatic life may not survive. The water treatment and cleansing function performed by streams may be further reduced due to oxygen depletion in conduits. Recharge of groundwater through channels will be disrupted in channelized portions.

These natural concerns will be addressed in Maryland where the State Department of Water Resources reviews all development on wetlands. The Department's Interim Standards and Specifications for Retention of Storm Water to Control Accelerated Off-Site Erosion contains a minimum requirement that permanent on-site detention methods be capable of restricting the peak discharge from a two year frequency storm to approximately that discharge which would have occurred prior to development. To meet this requirement, the Department lists the following storm retention methods which reflect an attempt to minimize alterations of the natural system and to capitalize on the natural regulatory functions provided by the natural system:

- Use of pervious surfaces such as grass swales and graveled parking lots or infiltration devices, such as dry wells, to decrease the amount of run-off from the site.
- Use of the natural drainage system whereever possible; avoid significant filling or straightening of natural water courses including floodplains.
- Construct subsurface storage, rooftop storage, parking lot storage and other temporary detention devices.
- Construct permanent pools, or on-site detention ponds, which also act as silting ponds and reduce sedimentation.

In addition to these general methods applicable to all development in floodplains, the Department intends to recommend that WMATA also take the following measures:

- Design parts of station parking areas to pond water, possibly a few inches, to decrease run-off rate.

- Incorporate dry ponds or floodable open spaces, such as grass swales, in and around parking areas.
- Clear brush adjacent to preempted floodplain so that remaining plain can carry more water in overbank conditions.
- Compensate for potential water volume displaced by fill by excavating in unfilled areas.

Measures like the preceding ones will help to minimize possible negative hydrologic effects caused by Metro construction.

Water Quality[1]

Several facets of water quality are considered in this Report: sedimentation, hydrology and roadway runoff. The first two, sedimentation and hydrology, are dealt with under separate headings, while an appraisal of roadway runoff follows.

The reduction of vehicular traffic by a mass transit system will result in significant improvements in regional water quality. Although no well-quantified data is available for the Metro system, it is documented that contamination from highway runoff, particularly the hydrocarbons, has specific adverse effects on water quality. Reduction of the number of automobiles should decrease this contamination from roadway runoff.

The hydrocarbons in highway runoff, as well as oil and grease from vehicle drippings, result in the perturbation of aquatic systems in the following ways.

- The surface film produced disturbs the surface tension essential to numberous aquatic forms such as water striders and whirligigs and interferes with the breathing of insects which are not truly aquatic and breathe at the surface or carry air bubbles below.
- The settleable fraction of the contaminants may degrade bottom habitats for aquatic organisms.
- The soluble or colloidal fraction, such as the lead from motor oil and other additives including zinc in gasoline, are toxic to many members of aquatic communities and will reduce population diversities.
- Hydrocarbons also increase the BOD of surface waters.
- Hydrocarbons make surface-feeding fishes dislike their food.

Although this aspect of automotive pollution is infrequently considered, it is nonetheless important. The

[1]Additional information concerning water quality is presented in Appendix C of Report, Geology and Watersheds Study.

*Footnote added

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wide use of lead and other gasoline additives and the dispersal of engine exhaust into the atmosphere make these contaminants available for solution in rainfall and fresh water. The availability of these contaminants should be reduced constituting a long-term positive impact of the Metro system.

Actions WMATA Proposes To Take To Modify or Correct Groundwater, Surface Water, and Geology Impacts

The following is a partial but representative list of those actions which WMATA proposes to take to ameliorate possible megative impacts to the groundwater, surface water, and geology of the area. It also shows some actions WMATA will take to avoid negative impacts on Metro by the groundwater, surface water, and geology.

These were taken from General Provisions and Standard Specifications for Construction Projects published by WMATA in 1973. Reference should be made to this publication for more specific information. If precise on-site information is required, please refer to the individual specifications manuals for the various segments of the various Metro routes.

Section 101 3.D. (25).a. The contractor shall conduct his operations in a manner to minimize pollution of the environment surrounding the area of work by every means possible.

(1) Trucks are to be cleaned of mud before going on public roads and are to be loaded so that nothing will spill in transit and if there is any spillage the contractor will immediately clean it up.

(2) No waste or erosion materials shall be allowed to enter natural or man-made water or sewage removal systems. The contractor will use whatever means necessary to achieve this.

Section 101 3.D(25).b. The contractor shall submit a program for pollution control to the Engineer for his approval prior to beginning operations.

Section 101 3.D(16).a. To detect subsidence and damages wrought by it on buildings and structures, a system of horizontal and vertical control points will be established.

b. Weekly checks will be made and if any damage occurs, repairs will be made.

Section 205 1.2A2. Design dewatering methods so that after initial development, the quantity and size of soil particles will decrease until no soil particles are present in water

*New section added

being pumped at any time after 12 hours initial pumping. This will reduce siltation of adjacent surface water.

Section 205 3.1A and D. Divert surface water around construction site and return it to original place after construction.

Section 205 3.2B. Install settling basins.

Section 205 3.4 Maintain records on groundwater levels before and during dewatering using piezometers.

Section 206 1.2A. Support excavation cuts in such a manner as to prevent and minimize any slurping, sliding, or falling of cut walls.

Section 210. Install and maintain underpinning to those buildings which may sustain damage on subsidence from Metro activities.

Section 701. Make Metro tunnels waterproof. This will help keep any pollutants out of groundwater while Metro is in operation

Vegetation and Wildlife

Most of the short-term impacts caused by Metro construction are due to the loss of vegetation along the routes. In the General Provisions for WMATA contracts, the following procedures are outlined for the protection and restoration of vegetation on the construction sites and staging areas:

> "The contractor will preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not to be removed and which does not unreasonably interfere with the construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any limbs or branches or trees broken during such operation or by the careless operation of equipment, or by workmen, shall be trimmed with a clean cut and painted with an approved tree prining compound as directed by the Contracting Officer.
>
> During contruction operations on this Contract, certain areas currently grassed and landscaped may be disturbe or otherwise damaged. The restoration of these areas shall be a part of the work required of the contractor. Restoration of pavements, sidewalks, curbs, tree boxes, and planted areas is specified in the Technical Provisions."

A considerable diversity of vegetation occurs within the area of Washinton, D. C., Maryland and Virginia that is to be serviced by Metro. The urban areas are characterized by wooded parklands that are artificial and landscaped in character. Parks such as Farragut Square, Franklin Park, James Monroe Park and the Mall serve a very large population and are well adapted to the urban setting. Where these areas coincide with cut-and-cover sections of subway or with Metro staging areas, there will be short-term impacts with short-term impacts with some loss of vegetation; in certain parks, the loss is considerable. However, all of these sites are scheduled to be replanted as completely as possible upon completion of Metro, and efforts are being made to minimize the initial disturbance.

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Where parks have mature specimen trees, such as the Mall, it will be many years before the new trees reach the stature of those removed; still, the essential character of these urban parks will remain. Removed street trees are also scheduled to be replanted, and involve no major long-term impacts. Almost no urban parkland will be preempted for use by Metro; the occasional vent shaft or access facility should involve no significant disruption of park facilities.

Roadside or highway median vegetation is found throughout Metro alignments adjacent to and within transportation corridors, both rail and highway, and is particularly evident along the route from Rosslyn to Washington National Airport in Virginia. For the most part, these areas are largely grassland, partially maintained, with an occasional tree. Again, the impact of Metro on these areas will be largely short-term, confined to construction activity. Replanting will restore disturbed areas to their original conditions; and, in several cases, landscaping upon completion of Metro will improve areas.

All contract procedures will be further amplified by planting requirements of local jurisdictions. This approach to protection and restoration of vegetation can be applied to parkland and landscaped areas where specimen trees and shrubs occur on a grassy plot. However, in a truly wooded and natural site, the diversity of vegetation is such that restoration to the original character is nearly impossible; restoration of an old field is even more difficult. Although grass plantings with trees on these sites would in some cases, enhance their utility as recreation areas, their use as wildlife habitat would be restricted considerably. Furthermore, the landscaping of forested areas to provide wooded parkland, although useful recreationally, involves complete modification of a formerly natural area.

In Maryland and Virginia, and, to a lesser extent in Washington ,D.C., the Metro routes run along some areas of forest that are essentially natural in character and serve as excellent wildlife habitat. These linear forests, in many cases located adjacent to stream courses, not only act as wildlife corridors but also facilitate access to and from more major open spaces. It is in these limited areas that the impact of Metro will have long-term significance.

Because four Metro alignments are partially coordinated with other transportation rights-of-way, accountability for potential negative environmental impacts due to the two functions should be shared. Sections of the E Route share a common alignment with the proposed I-95; the K Route is planned to follow the proposed I-66 right-of-way; and the D Route utilizes the

*Fifth paragraph revised

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corridor of the Penn Central and Baltimore and Ohio Railroads. If approval is granted for the highway alignments, the impact of Metro on the vegetation in these areas will be minimal, although I-95 and I-66 will disrupt wildlife corridors and in some cases excellent quality natural forest, both upland and lowland. Metro land requirements are significantly less than those of the highway alignments; therefore, its impact would be less than that of highway construction.

Portions of several alignments (E,D and several other routes) are located in floodplain forests that are presently of excellent quality, despite being currently zoned industrial. In these cases, the Metro tracks will not entail the removal of significant forest; however, the construction of station parking lots and access facilities will take areas of lowland floodplain forest. For example, Landover and Cheverly Stations in the D Route have station facilities located in the floodplain of Beaverdam Creek. Most of this area is mature lowland hardwood forest interspersed with occasional thickets and old fields, providing excellent wildlife habitat. Although most of this land is zoned industrial, it is presently in excellent condition. Both Metro and industrial development are expected to result in negative impacts on the native forest and wildlife in this area.

In several cases, WMATA has taken positive actions to avoid long-term negative impacts. For example, Roaches Run Waterfowl Sanctuary on the Virginia side of the present L Route has been avoided, although earlier alternatives would have caused disruption to this sanctuary. The K Route past Glebe Road Station, utilizing the proposed I-66 right-of-way will bisect a major greenbelt. Although there is not a significant amount of good quality forest in this area, the greenbelt is actively used for recreation by the local residents. Several studies are presently underway to minimize the impact of Metro and I-66 on this area. Berms as well as extensive landscaping will be used as aids to buffer the corridor. A pathway system is being designed to allow an active continuation of recreational activities.

There are several sites, however, where even a well planned landscape program may not overcome the problems caused by grading and clearing. The Glenmont Yard (B Route), for example, is located in steep-sided valley that is almost entirely forested with oak, hickory and tulip poplar. The Springfield Station (J Route) is located on top of Backlick Run. The station and parking facilities are situated in a mature forest of beech, sycamore, scarlet oak, hickory and sassafras. The wooded areas will have to be cleared; the cutting and filling necessary will alter the natural topography and will require erosion control measures.

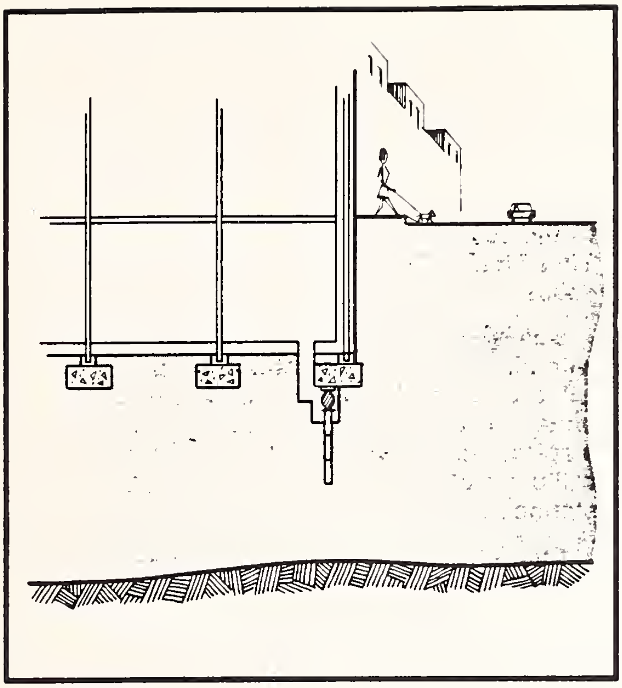
Although none of these areas is large in size, the remaining forest is a valuable resource, culturally as well as ecologically in a rapidly urbanizing region. The narrow greenbelts are of great importance to the remaining wildlife. However, it should be emphasized that the lands being utilized for Metro in these areas are generally under private ownership and are zoned for development. In most cases the intensity of development permitted would result in removal of vegetation greater than that required for Metro.

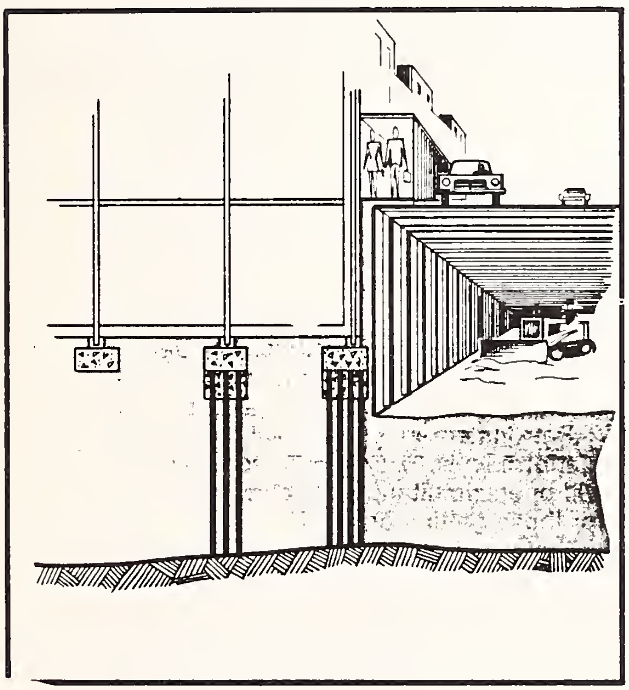
VISUAL AND PHYSICAL IMPACTS

The extent of visual and physical effects caused by the Metro system is dependent largely on two variables; the type of construction method employed and the character of the area in which it is built. The urban more built-up portions are potentially more likely to experience physical disturbance due to the lack of flexibility in the space available for the alignment. The location of a double box for two tracks of Metro operation within some streets would be impossible without major underpinning of structures along the route. The interior dimension of a typical double box is 29 feet; thus, when about 3 feet is allowed for the exterior walls, it would completely underlie a cartway of 32 feet, making the distance to the building line, if it is the same as the street right-of-way, the same as the sidewalk width. This distance, the depth of the subway, and the height of structures adjoining the alignment are crucial factors in determining the extent of underpinning.

As illustrated in the diagram, one method of underpinning is a process whereby steel piles are placed under a building's foundation to act like great stilts in supporting the structure. These supports are stronger than the building's original foundation, thus ensuring that Metro construction and operation will not disturb the structure. Since buildings along the streets vary as well as street widths along the routes, the approved alignments will have differing amounts of underpinning necessary. WMATA and its consultants have determined individually the underpinning requirements for all existing buildings and their structural integrity is assured.

In addition to the underpinning of structures in urban or congested areas, the relocation of families and businesses due to the taking of property can normally be expected to rise. However, considering the scope of the full 98.02 mile Metro system, minimal relocation is necessary. Relocation is kept at a low





Pits are dug and piles jacked to load-bearing depths. Concrete is poured and the building strengthened for the nearby subway cut.

Figure 2: UNDERPINNING

Source: " Metro Memo" WMATA July—August 1972

level in urban areas, primarily because of the use of cut-and-cover construction methods and the location of the subway under existing street rights-of-way. In the central business district, structures are taken for the alignment primarily where the routes change direction and, therefore, must undercut them. However, in some cases structures have been purchased and removed to provide staging areas as in the example of several buildings along the C Route. Also, in built-up areas it was necessary and desirable to locate entrances in existing structures so as to minimize their visual intrusion upon the area. This necessitated relocating or removing small shops, such as opticians or camera shops, on the ground floors of buildings. For example, several stores in the F Route are to be relocated to provide an entrance to Anacostia Station. Relocation is discussed further under the appraisal of Social and Economic Impacts.

There are other physical additions or changes which potentially have an impact. Chiller plants and substations necessitate structures which, if not treated architecturally or landscaped, have the potential of becoming intrusions into a neighborhood. These auxiliary facilities have, wherever possible, been located underground or incorporated into existing or proposed building designs. In open areas they are buffered by planting and berms. WMATA is planning for thier conformity as the situation dictates. In some cases, this has involved blending auxiliary facilities in with existing structures, such as occurs at Thompson's Boat Center along the C Route alignment.

Outside downtown Washington, the Metro system includes on-grade or aerial structures as well as subway. In these areas the potential for physical disruption is less because these structures are located in open areas or along existing rail or road rights-of-way. However, the potential visual effect, on a long-term basis, increases. Because these alignments act as constraints on future use as well as permanent visual additions, WMATA staff are working with all interested persons to achieve structures which maintain local access, recognize siting considerations and employ landscaping to minimize instrusiveness, and are acceptable to the communities.

Although alignment locations may affect the spatial distribution of neighborhoods and residential areas, Metro alignments will not divide communities. In some instances, where Metro shares an existing rail or road right-of-way, the alignment will reinforce an already existing physical determinant, acting as a spine with two sides accessible to one another only at selected crossings.

In addition to the physical elements added or altered, the views of Metro users and alterations to scenic resources are other considerations. Views are created by the Metro system which will be long-term;

however, the major impact to scenic resources is the short-term disruption due to construction activity. Areas such as the Mall, the parklands between the Capital and Union Station and other scenic attractions in Washington will be disturbed. This is a necessary adjunct of the undertaking, and one which will be minimized during construction by provisions included in construction contracts calling for prompt removal of debris, fencing, clean-up operations, and rapid restoration to former conditions on completion of the work. In all cases, landscaped areas disturbed or trees taken are to be replaced. The time lag for growth of planting will mean a period of decreased vegetative quality; however, in some instances, such as in the replanting of vegetation along highway rights-of-way shared by Metro, quality should be improved as a result of Metro actions.

Construction activ ities, of necessity, result in temporary inconveniences, one of which is the disturbance of the appearance of an area. The visual aspect of construction activities is the most pronounced in areas of cut-and-cover, Dust, noise and traffic congestion result even if minimized by WMATA contract requirements. However, this is a negative impact of short duration. Rock or earth tunneling results in less disruption along the alignment, but concentrates activities at access points. Aerial or on-grade structures, because of the location of the alignments, are unobtrusive in most cases.

Care is being taken to design surface and aerial alignments and stations in a manner which will complement and integrate with the surrounding environment. Community input will be incorporated to generate a local character for the structures. Station design is unified throughout the system so that while there will be locally generated varications between stations, all will have common elements. This unity will have the effect of producing a system which is visually subtle and natural in setting. For example, natural colors of exposed concrete walls and vaults, reddish-brown quarry tile floors and bronze fixtures characterize all stations. On the surface, subway stations will be discrete with entrances marked by a square pylon with the Metro symbol. Aerial and on-grade stations will be simple, straight-forward structures of concrete and glass. The alignments, themselves, as discussed previously, will be discreet, and every attempt will be made to maintain neighborhood and community identity and coherence and to minimize any potential visual intrusion or physical access barrier through coordination of community interests. In general, short-term disturbances caused by Metro constrution will be more than balanced by the long-term visual and physical benefits created by the Metro system as a whole.

*third paragraph expanded

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Design coordination between WMATA and the residents and governments of jurisdictions served by the WMATA System occurs throughout the process of station and alignment design. First site plans are reviewed by regional and local government agencies; then general plans are developed and reviewed by regional and local government agencies, and presented at public hearings where public comments are encouraged and recorded. An addition governmental and public design review takes place in the review of environmental studies of the alignments and public hearings where these studies are presented and discussed. Only when the comments of all reviewing government agencies and all public hearing testimony has been reviewed and changes in plans made as appropriate, does the final design stage begin. Thus both citizens concerned with design aspects of the system and the local government agencies concerned with design compatibility in each jurisdiction, including planning commissions, historic commissions and fine arts commissions are requested to participate at each stage in system design, in assuring visual compatibility of alignments and stations with surrounding area. Such participation is informal in the early stages of alignment and station design, becoming more formal and structured at the general plan and final plan stages. The WMATA offices of Community Services and Planning are responsible for different aspects of this coordination: The Office of Community Services is responsible for relaying citizens comments obtained at informal meetings to other WMATA offices, and the Office of Planning is responsible for coordination with local government agencies concerned with questions of system design compatibility.

When dealing with socio-economic factors, it is sometimes difficult, if not impossible, to distinguish between impacts directly attributable to Metro and those which would have occurred even without Metro. It is also difficult to quantify socio-economic impacts. The following appraisal of Metro's relationship to population, employment, accessibility and development trends in the Metropolitan area gives a general indication of Metro's regional impact, and where possible, estimates in more specific areas along Metro.

Population

Washington is one of the fastest growing metropolitan areas in the country. The population of this region reached 2.8 million in 1970. It is projected to reach about 7.7 million by the year 2000.[1]

In 1940, less than one-third of the metropolitan population resided outside the District. During the last two decades, this pattern was reversed. In 1970, over two thirds of the population lived in the suburbs. The District experienced a net out-migration of population during the last two decades. In the future, the distribution of the metropolitan population should continue to shift to the suburbs. Ninety-five percent of the future population growth is forecast for the Maryland and Virginia suburbs.[2]

Metro is expected to facilitate this trend by making outlying areas more accessible. Just as the Beltway encouraged growth during the last decade, population growth trends should be accelerated in areas directly served by Metro. Likewise, outlying areas without Metro service may experience a somewhat lower growth rate.

In general, though, Metro is expected to have more of an impact on the distribution of population than on actual growth itself. Population distribution implications of Metro are discussed subsequently under Land Use and Future Development.

Employment

Along with population growth in the suburbs, Washington is experiencing a decentralization of employment. Retail sales, manufacturing and office jobs are shifting to the suburbs. The District is not actually losing jobs,

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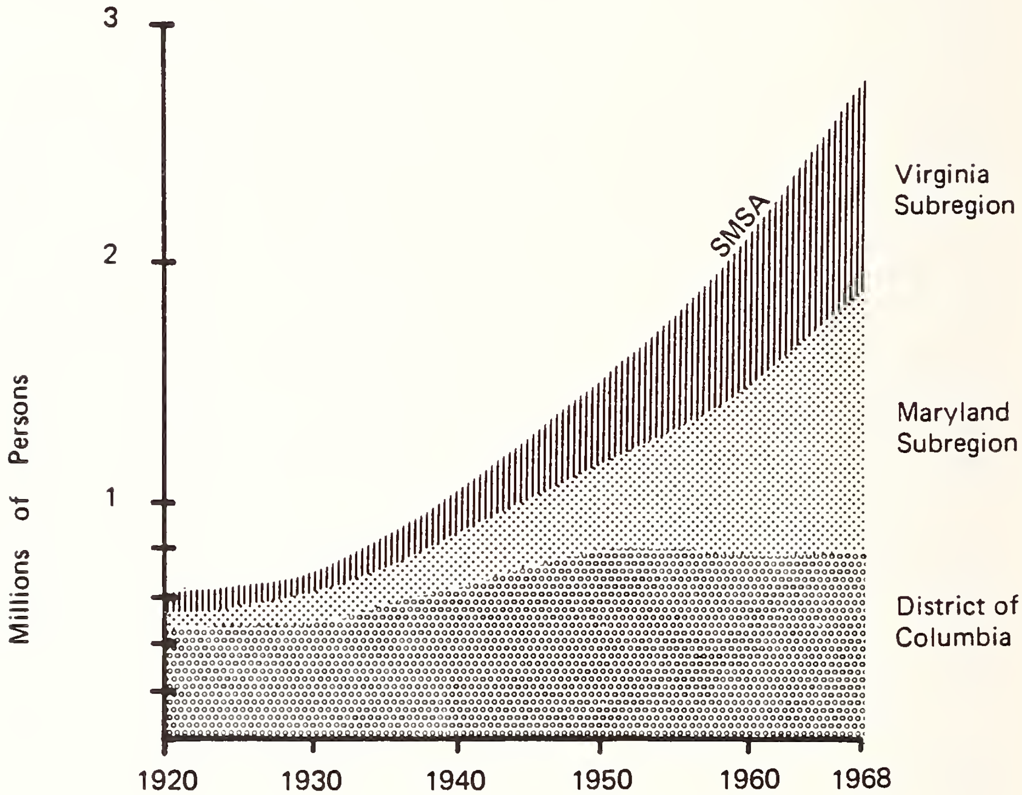
[1]Revised unofficial projections by WashCOG through 1995 modified as of March 1974 suggest that the population of the region may be closer to 5.0 million by the year 2000. These unofficial projections are presented in Figure 4 on page 55.

[2]Current residential density figures by jurisdiction for the Washington Metropolitan area are contained in the series of volumes prepared by Wallace, McHarg, Roberts and Todd for WMATA titled Environmental Studies of Alternate Routes, 1972 F.F.

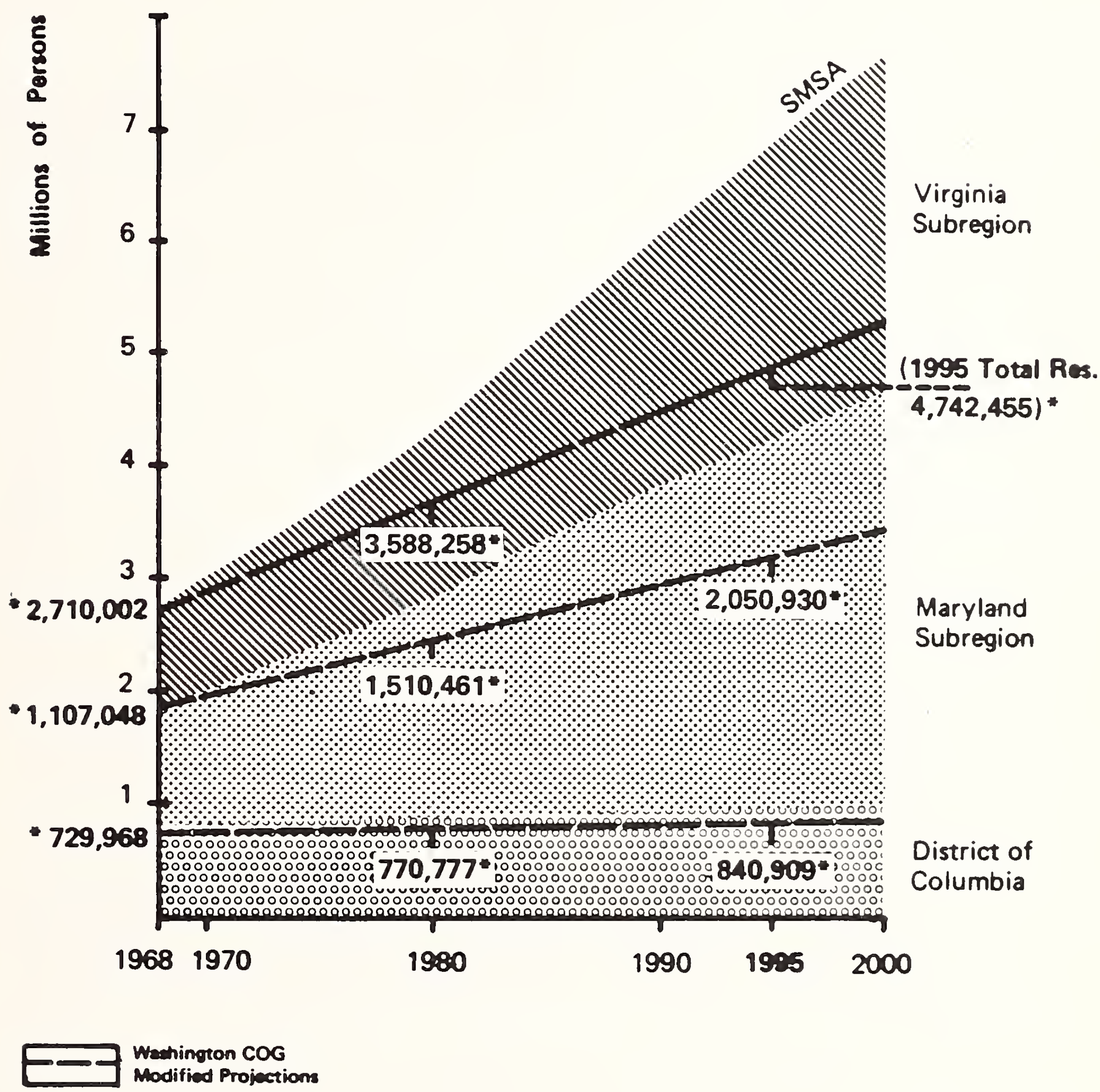
Figure 3:
Population Growth Trends in Metropolitan Washington by Subregion 1920-1968



Source: Hammer, Greene, Siler Associates, The Economy of Metropolitan Washington, July 1969.

Figure 4:

Population Growth in Metropolitan Washington by Subregion 1968 (Actual) to 2000 (Projected)



REVISED *Washington COG 1974 projections added

Source: 1. Hammer, Greene, Siler Asso., The Economy of Metropolitan Washington, July 1969

2. Washington COG Unofficial Population Projections from Alt 6.2 (Modified March 1974)

but new jobs are not being added to the District economy as rapidly as they are being created in Virginia and Maryland.

While the same trend is occurring in large metropolitan areas across the country, the Washington area during the last decade experienced a most dramatic shift to the suburbs. According to the U.S. Census, in 1960, the District had 63.8% of the jobs in the metropolitan area; in 1970, it had only 45.1%. Even with its heavy concentration of government jobs, the District was not able to keep up with the employment growth in the suburbs.

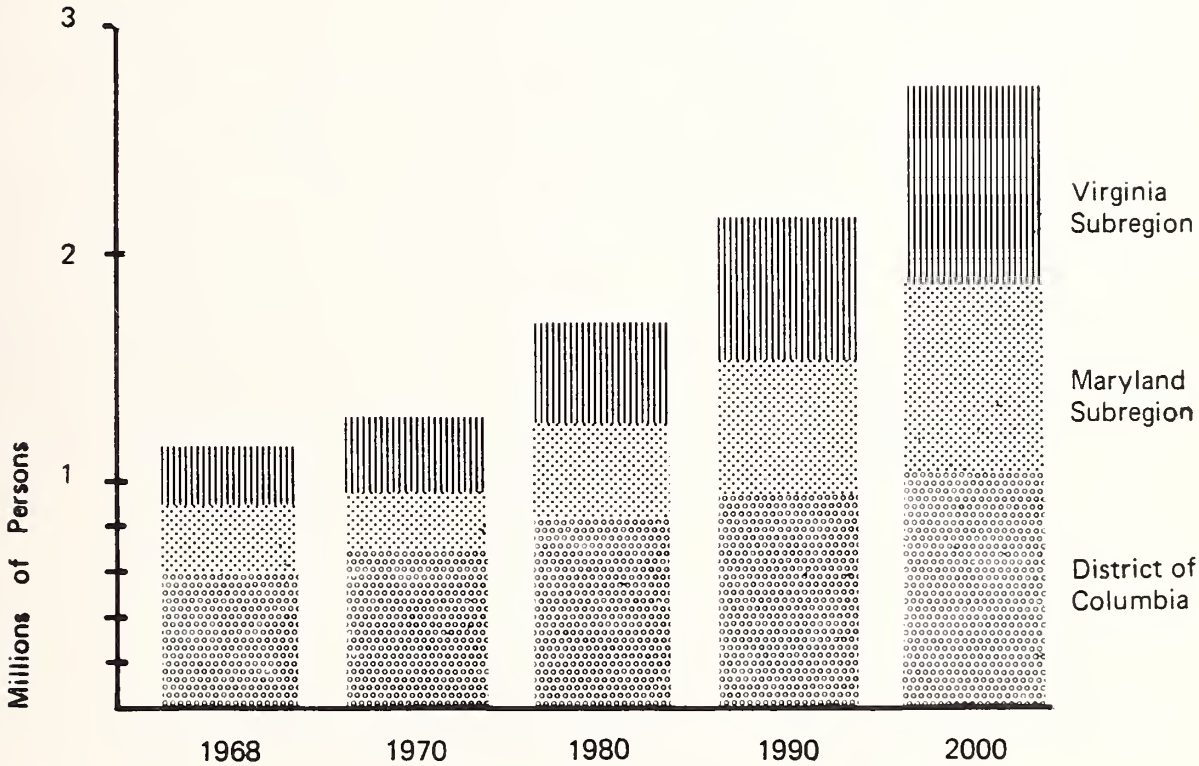
While Metro cannot be expected to reverse this trend, it can help the District maintain its economic viability. COG projections, based on the assumption of Metro service, show the District with about 40% of the region's jobs in the year 2000. The added accessibility provided by Metro is expected to be an important factor in retaining downtown employment and promoting new jobs in the District.

An extensive network of Metro service is planned in the downtown core. North/south trunk lines are formed by the E and F Routes along 7th Street and the D Route along 12th Street. These trunk lines serve the central business district, the Federal Triangle, the Mall and southwest Washington. The C Route serves the office area centered on K and Eye Streets between McPherson and Farragut Squares. The A Route enters the same office area from the north, traverses the central business district and meets the B Route at Metro Center. The B Route links downtown and the Judiciary Square area with Union Station. The L Route provides a second Metro connection between Virginia and downtown. Together these routes have 13 stations serving downtown. Two-thirds of Metro's 1990 projected daily trips will be through these downtown stations.

Most all the Metro routes serve a large number of employees working in the District of Columbia. In 1970, slightly over 40% of the workers residing in the metropolitan area worked in the District; 10% worked in the central business district. As Metro begins to operate and the residential population along the routes grow, more employees will be commuting to the District on Metro. Rapid transit service linking downtown Washington with growing suburban communities will increase the District's potential for employment growth.

Decentralization is but one of the important employment trends in the region. The other involves the growth in white collar jobs. Over half of the new jobs created in the metropolitan area over the last decade have been in the higher skilled occupations, professional, technical,

Figure 5:
Total At-Place Employment Growth in Metropolitan Washington by Subregion
1968 (Actual) to 2000 (Projected)



Source: Hammer, Greene, Siler Associates, The Economy of Metropolitan Washington, July 1969

managerial and clerical workers. These occupational groups comprise the main types of labor required by the area's major employment sectors: government, services and trade.[1]

Table 17: Mode of Arrival from Selected Stations in Downtown Washington for 24-Hour Period in 1990.

Station	Walk	Bus	Drive & Park	Auto-Pass-enger	Kiss -n- Ride	Total
Archives	10,690	1,300	0	0	0	11,900
Capitol South	13,126	4,120	0	0	0	17,265
Dupont Circle	9,800	22,609	0	0	167	32,576
Farragut North	33,550	643	0	0	0	34,193
Farragut West	27,013	4	0	0	0	27,017
Federal Center, Southwest	3,505	1,766	0	0	0	5,271
Federal Tri'gle	10,620	3,687	0	0	0	14,307
Foggy Bottom G.W.U.	13,424	9,181	0	0	113	22,718
Gallery Pl.	14,206	1,723	0	0	35	15,964
Judiciary Sq.	11,816	234	0	0	9	12,059
L'Enfant Pl.	32,560	840	0	0	0	33,400
McPherson Sq.	23,986	2,243	0	0	6	26,235
Metro Center	39,248	1,544	0	0	0	40,792
Smithsonian	16,900	450	0	0	0	17,350
Union Station	13,110	6,621	0	0	69	19,800
Total Downtown	273,554	56,975	0	0	408	330,937
%	82.6	17.2	0	0	.12	99.9
TOTAL METRO	453,476	446,585	29,208	5,852	23,839	958,960
%	47.3	46.6	3.0	.6	2.5	100.0

Source: WMATA, NIA, 1969, as revised.

Note: Updated figures for these tables are not yet available from the 1974 Net Income Anaylysis.

In the future, these sectors are expected to continue to dominate. There will be, however, a new emphasis upon economic activities which provide goods and services to the area's residents. The federal government, while remaining the region's largest employer, will diminish slightly in relative importance. This trend will be more pronounced in the suburbs where employment gains in private business activities will make the suburbs less dependent on the federal government. This diversification of the economic base is an important

[1]Current income figures by jurisdiction for the Washington Metropolitan area are contained in the series of volumes prepared by Wallace, McHarg, Roberts, and Todd for WMATA titled Environmental Studies of Alternate Routes, 1972 F.F. These volumes specify plans for provision of service by income level and geographic location.

*Footnote added

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trend, especially as it applies to services, trade and manufacturing because these sectors employ more semi-skilled and blue collar workers.

While Metro will have more of an impact on job location rather than type of employment, these occupational trends are expected to be reinforced by Metro. Moreover, Metro will provide inner city residents with better access to jobs in the suburbs. Consequently, unemployment problems in the District could be reduced. Improved access to suburban jobs, however, will only affect unemployment caused by lack of mobility, not that attributable to lack of marketable skills. Nonetheless, clerical, blue collar and service jobs are growing in the suburbs at a faster rate than in the District and Metro will improve accessibility to them. The D Route in particular will open up employment opportunities in the growing number of industrial and manufacturing jobs developing in several industrial parks along the route.[1]

Many Metro routes serve growing commercial centers where blue collar, clerical and service opportunities will be expanding in conjunction with opportunities in other occupations. The reverse haul commuter will be able to reach these centers plus those nearby via Metro and the improved regional bus system planned by WMATA.

Metro construction and operation will have direct impact on employment opportunities in the region. Over the projected 10-year building span, an estimated 40%, or approximately $1 billion, of total system costs will go for the wages of construction workers. A cumulative total of 12,000 to 15,000 persons (including both turn-overs and move-overs) is expected to be on the payroll during the life of Metro's construction program. The type of workers in greatest demand varies according to the different phases of construction. Skilled, semi-skilled and unskilled workers are all required. Minority workers and enterprises will be recruited and assisted where necessary in order to achieve a substantial amount of minority involvement in this large building project. Then, too, when construction is complete, operation and maintenance of Metro will be a new source of permanent jobs for the entire region.

In addition to the long-term positive effects of Metro on employment, there will be negative ones of short-duration. A number of employment centers dispersed throughout the metropolitan area will be disrupted by Metro construction. Temporary disruptions will be most acute along cut-and-cover portions of the alignments. Pedestrian and vehicular access to business establishments will be maintained throughout construction; however, there will be increased traffic congestion at

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[1]Detailed analyses of station potential for reverse commuting, by amount and type of employment within walking distance of proposed METRO stations, are presented in the series of volumes prepared by Wallace, McHarg, Roberts and Todd for WMATA, titled <u>Environmental Studies of Alternate Routes, 1972 F.F.</u>

at busy intersections affected by Metro. In commercial areas this may negatively affect business. Noise and dirt from construction activities, while strictly controlled by WMATA contract provisions, may also prove disruptive during some early phases of construction.

Relocation of businesses has been held to a minimum. A total of 722 businesses will be required to relocate for the 98.02mile system. Over half of these businesses are located in the District. Because much of the Metro system is in existing street and railroad rights-of-way, WMATA has been able to avoid alignments which necessitate large-scale displacement. Relocation of businesses will be required in limited areas to widen existing rights-of-way and to provide access to stations and sites for staging areas. Most of the businesses to be relocated are small and do not employ many people.

Table 18: Business Relocation Required for Metro Construction

Jurisdiction	Total Businesses to be Relocated Number	Percent
D.C.	415	57.5
Arlington County	96	13.3
City of Alexandria	14	1.9
Fairfax County	7	1.0
Montgomery County	161	22.3
Prince George's County	29	4.0
TOTAL	722*	100.0

Route	Number	Percent
A	120	16.6
B	269	37.3
C	46	6.4
D	25	3.5
E	85	11.8
F	55	7.6
G	27	3.7
H	0	0
J	3	0.4
K	92	12.7
L	0	0
TOTAL	722	100.0

Source: WMATA, June, 1975

*Relocation figures updated

Relocated property owners will be compensated the fair market value for land and structures. Owners and tenants will receive assistance in finding a new location, payment for expenses incurred in searching for replacement property, and reimbursement for moving expenses (or payment in lieu of moving expenses). Appeal procedures have been established for firms not satisfied with relocation services and payments. The Small Business Administration (SBA) is authorized to make long-term low-interest loans to eligible businesses relocated by Metro. These loans may be used to get re-established and may include funds for working capital, the purchase of new furnishings and equipment, the purchase and improvement of existing facilities or for construction of new facilities. In addition, the SBA can assist eligible small business concerns to obtain leases of commercial and industrial properties by guaranteeing payment of rentals under such leases. WMATA's relocation program is administered in accordance with the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970", which is judged adequate in terms of both services and payments.

Accessibility

Metro will provide greater ease of movement into and out of downtown Washington and throughout the region. This accessibility will have different impacts, some quantifiable and some not. Those that have been quantified are included under Traffic and Parking. Others, less easily defined but important nonetheless, are summarized below.

- Better transportation for the young and aged. An increasing proportion of the Washington population is becoming too old to drive safely or too young to drive legally. The under 15 and over 60 age groups are projected to be 45% of the total population in 1990. Transit will provide these groups with safe and inexpensive transportation, which will help them to participate more fully in community activities. 1/
- Improved access for the handicapped. The Metro system will be designed to meet the American National Standards Institute specifications (ANSI-A117.1) for making buildings accessible to the handicapped. Station and train design features which will greatly aid the mobility of the handicapped include:

1/ Analyses of the incidence of transit dependence, measured by the number of households without automobiles has been conducted for each alternate route. These are contained in Wallace, McHarg, Roberts, and Todd, Environmental Studies of Alternate Routes, 1972, ff.

*footnote added

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- Specially designed access points for case in arrival and departure from stations.
- Escalators from street level to train platforms throughout the systems.
- Audio and visual train announcing systems.
- A number of design features including ramps between the parking lot and the station entrance, white painted step faces, non-slip floor surfaces, hand rails in stations and grab bars on trains at heights and diameters amenable to the handicapped, conveniently located benches, toilet facilities, minimum distances between the edge of platforms and trains, and train doors wide enough for wheelchairs.

These features and others, some of which exceed ANSI specifications, will make Metro accessible to approximately 97% of all those estimated to suffer physical handicaps. The minority in wheelchairs and those unable to use escalators, will not have easy access however, without escalators. An additional $60 to $65 million is needed to provide elevators throughout the system. WMATA has adopted a resolution providing for the inclusion of elevators in all Metro stations "subject to the availability of federal funds" to finance this added cost. Detailed plans are underway for the inclusion of elevators at all stations. Expanded educational opportunities. Students attending colleges and universities as well as primary and secondary schools will benefit from Metro service. High school and commuter schools, particularly those serving low to moderate income students, are expected to benefit substantially from the added accessibility. Increased accessibility of cultural and recreational activities. Residents in the region seeking cultural and recreational activities in the District face traffic congestion and a shortage of parking facilities. These problems are compounded by the heavy reliance of tourists on automobile. Metro service should divert a considerable number of visitors from their autos and alleviate traffic and parking congestion, allowing improved access to cultural and recreational activities around the Mall and along the Potomac River. Access to RFK Stadium and Arlington Cemetery will also be provided by the C and D Routes. The Zoo is served by the A Route. Increased accessibility of cultural and recreaional activities should be a stimulus to tourism as well as a benefit to local residents.

*First and second paragraphs revised and expanded

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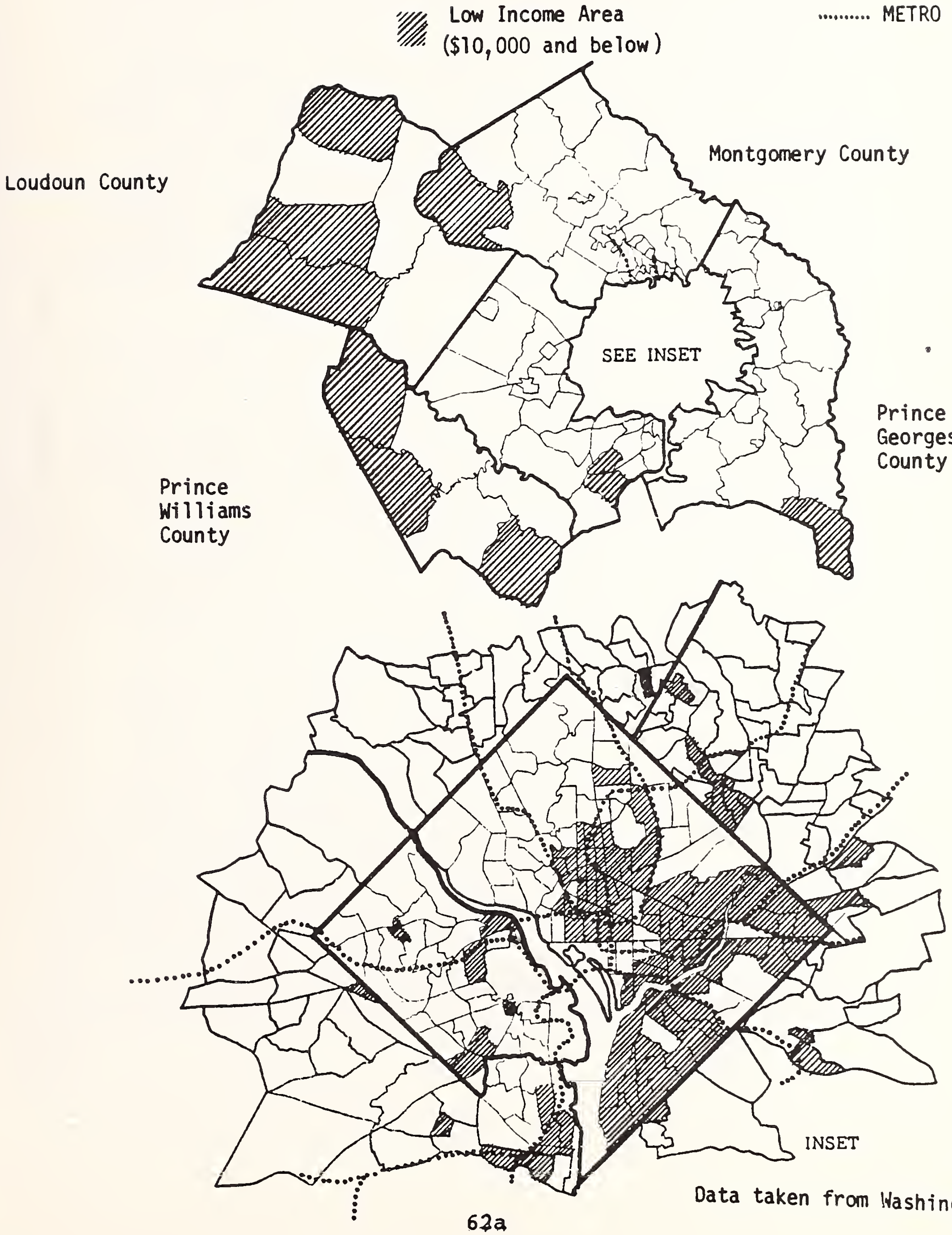
FAMILY INCOME



Data taken from Washington COG

Traffic and Parking

Over the short-run some traffic and circulation problems relate to Metro construction, with most problems occurring where major streets and intersections are involved in cut-and-cover construction. Long traffic delays, however, are not anticipated for WMATA contract agreements stipulate that vehicular and pedestrian circulation will be maintained throughout the construction period.

Although traffic will be disrupted occasionally, the practice is to close some of the lanes in a street for a limited period of time, while maintaining traffic flow in other lanes in the same street. Particular attention is given to maintaining bus routes and bus stops during construction. Pedestrian traffic on sidewalks and access to buildings is also generally maintained. Any temporary closing of a street, sidewalk or other access requires approval from the D.C. Department of Highways and Traffic's Bureau of Traffic Engineering and Operations.

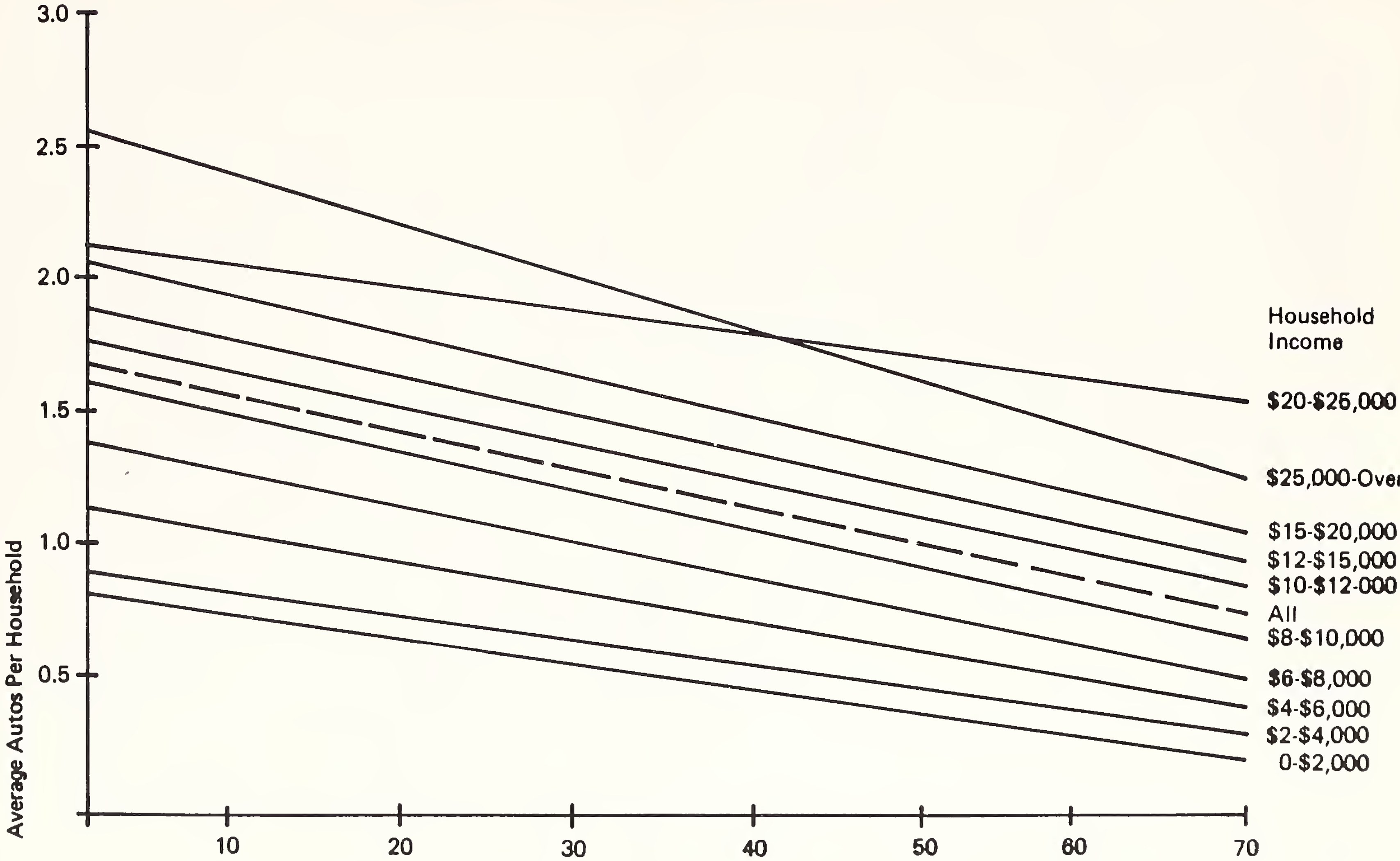
Only a few areas involve sizable problems. In downtown Washington, the following streets will be disrupted for cut-and-cover construction: Eye Street, G Street, Connecticut Avenue, D Street, 7th Street, N.W. at stations, 12th Street, N.W., and other less heavily travelled streets. Outside downtown there also will be disruptions. For example, access ramps to George Washington Memorial Parkway and Washington Boulevard will have to be detoured. In Crystal City at 18th Street, Metro must cut across the Jefferson Davis Highway.

Despite construction difficulties in these through traffic areas, vehicular access is being maintained and delays minimized. Overall, the long-term gains in relieved traffic congestion and reduced parking requirements can be expected to overcome the short-term circulation problems caused by Metro construction.

Over 77% of the workers in the Washington region drove automobiles to work in 1969. Metro has the potential of significantly reducing this figure. The COG 1968 study on automotive emissions demonstrated that automobile use declines the closer people are to transit. As illustrated on the accompanying graphs, auto ownership and daily vehicle trips decline as transit accessibility to employment increases. When Metro is in operation, the travel time to major employment centers in the region will be shortened. For example, referring to the table on travel times, it will take only 15 minutes to ride Metro from Silver Spring Station to Metro Center. The trip from Ardmore in Prince George's County through the central part of the District and across the Potomac to the Pentagon will take only 26 minutes.

Figure 6:

Relation of Average Auto Per Household to Income and Transit Accessibility to Employment



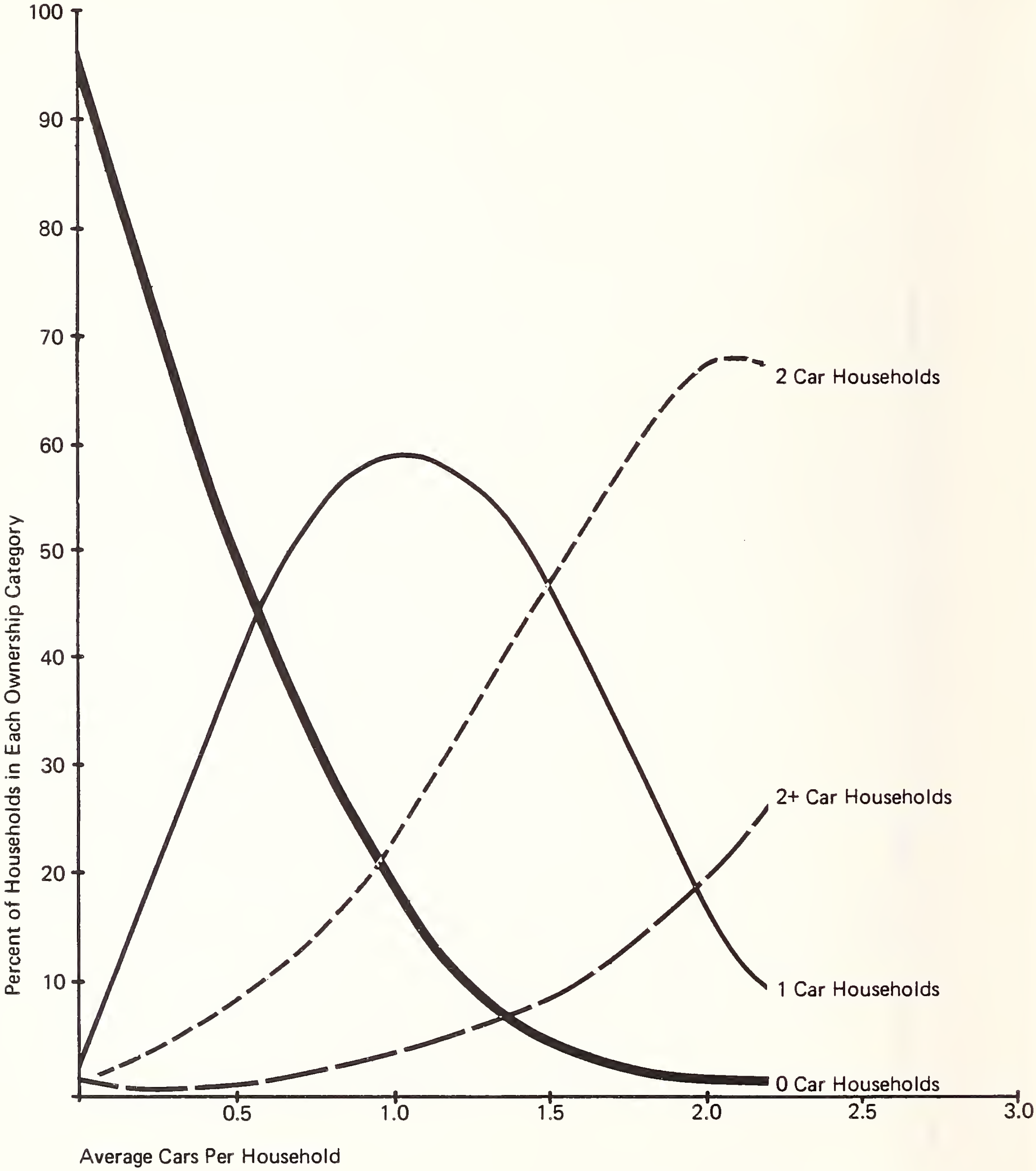
Percent of Regional Employment within 45 Minutes by Transit

NOTE: Calibration based on 1968 Wash. COG Home

Source:"Estimating Automotive Emissions of Alternative Transportation Systems", Washington COG, March 1972

Figure 7:

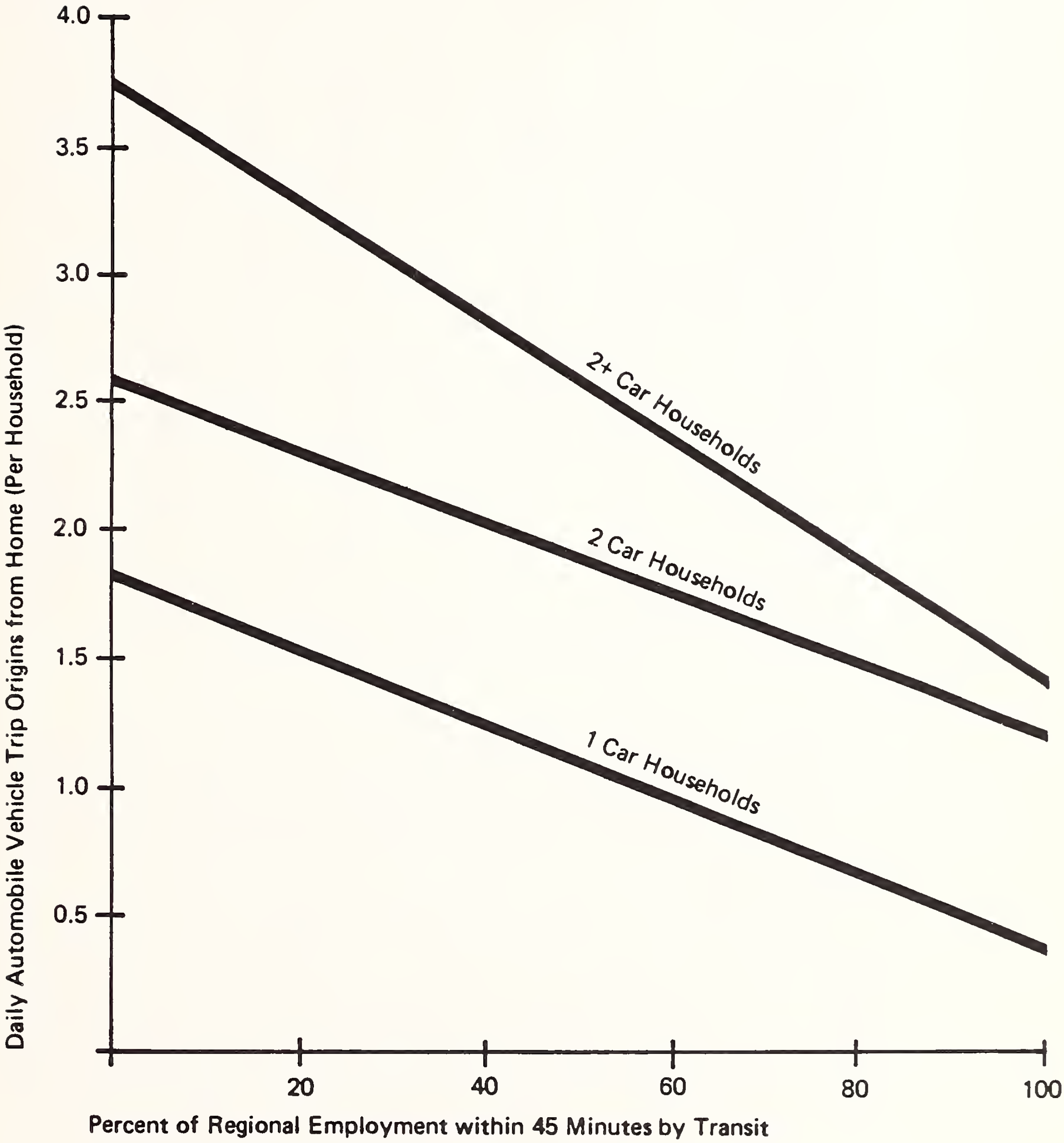
Distribution of 0, 1, 2 and 2+ Auto Households Versus Average Auto Ownership



Source: "Estimating Automotive Emissions of Alternative Transportation Systems", Wash. COG, March 1972

Figure 8:

Relation of Daily Auto Trip Origins from Home to Transit Accessibility to Employment and Auto Ownership



Source: Estimating Automotive Emissions of Alternative Transportation Systems," Washington COG, March 1972

Table 19:
Peak Period Travel Times Between Selected Metro Stations

	Metro Center	Gallery Place	L'Enfant Plaza	Dupont Circle	Rosslyn	Pentagon	Capitol South
Rockville	26	27	31	23	29	35	33
Grosvenor	19	20	24	16	22	28	26
Bethesda	14	16	19	11	18	24	22
Tenley Circle	10	11	15	7	13	19	17
Glenmont	22	20	24	25	29	28	28
Silver Spring	15	13	17	18	22	21	21
Fort Totten	10	9	12	14	18	17	16
Greenbelt Road	22	20	22	25	30	28	26
Prince George's Plaza	17	15	17	20	25	22	21
Columbia Heights	7	5	7	11	15	11	11
New Carrollton	23	23	19	27	29	26	17
Deanwood	16	16	12	20	22	19	10
Addison Road	20	20	16	24	26	23	14
Minnesota Avenue	14	14	10	18	20	17	8
Potomac Avenue	9	9	5	13	15	12	3
Branch Avenue	19	16	14	23	26	21	18
Suitland	16	14	11	20	23	18	15
Anacostia	10	8	5	14	17	12	9
Franconia	29	26	24	32	26	20	28
Springfield	30	27	25	33	27	21	29
Huntington	22	22	19	22	16	13	23
Crystal City	12	9	7	13	6	3	11
Vienna	26	29	30	26	20	26	33
East Falls Church	15	18	19	15	9	15	22
Clarendon	9	12	13	9	2	9	15
Rosslyn	6	9	10	6	–	6	12

Source: WMATA, 1971
Note: Travel time is in-vehicle time.

With shortened travel times, frequent service and direct links to major employment centers throughout the region, Metro can divert automobile users to transit. Such diversions would have a direct impact on highways and major arterials serving downtown Washington, Northern Virginia and Montgomery and Prince George's Counties in Maryland.

The central business district and Capitol area of Washington, in particular, is expected to benefit from the traffic diverted by Metro. Downtown congestion, which has reached critical proportions, will be relieved. Metro will prove to be an efficient method for moving large numbers of people during peak hours. By diverting peak-hour traffic, Metro will greatly expedite the flow of traffic around major employment centers in downtown.

In addition, demand for land to be used as parking space in the downtown area will be relieved, with the general consequence of promoting more efficient land use.

Northern Virginia and Maryland will share with downtown a number of benefits due to reduced automobile traffic. These benefits, estimated in a study prepared by Development Research Associates for Metro in 1968, are summarized below:

- Savings for transit users. Those individuals diverted from auto travel to transit travel will experience savings in terms of travel time, automobile costs and parking costs. By 2020, a total of $165,375,800 in time savings will be accrued because of shorter trip length and greater trip speeds on Metro. These factors plus decreased costs per mile will result in an added savings of $192,540,000 in auto operating costs. Parking cost savings for those commuters to downtown will total $253,735,400 by 2020. Insurance savings on commuter automobiles are estimated at $35,821,500. And, additional vehicle savings, for those diverted commuters who find they can do without a second or third car, will total about $294,333,180 by 2020.

  In addition to those transit users diverted from automobiles, present riders of all-bus systems will experience savings in travel times due to increased speeds for bus/rail or all rail travel. Savings to the constant transit user on the rail/bus system relative to the bus-only system are estimated to total $1,371,962,600 by 2020.
- Savings for automobile commuters. Commuters not choosing to switch from automobile to transit will also benefit from Metro. As autos are diverted from the highways, those remaining will experience decreased congestion and decreased commuting times. These savings of time have been calculated to total $545,680,500 by 2020.
- Savings to business. Certain sectors of the business community will also benefit directly from the introduction of rapid rail service. The trucking industry, whose drivers are earning a wage during the congested peak periods are estimated to save in time an amount equal to $68,657,800 by 2020. Suburban employers, who must provide parking facilities for their auto

driving employees, will benefit to the extent of $57,015,800 by 2020 as a portion of their employees commute by rail rather than by car.

Table 20: Cumulative Quantifiable Benefits by 2020
(In thousands, discounted to present)

Constant Transit Commuters	$ 1,371,962.6
Diverted Motorists	
Time Savings	165,375.8
Operating Cost Savings	192,540.4
Parking Cost Savings	253,735.4
Insurance Cost Savings	35,821.5
Additional Vehicle Savings	294,333.1
Non-Diverted Commuters	545,680.5
Business Community	
Time Savings to the Trucking Industry	68,657.8
Parking Facility Savings to Employers	57,015.8
TOTAL	$ 2,985,122.9

Source: Benefits to the Washington Area from the Adopted Regional Metro System. Prepared for WMATA by Development Research Associates, October 25,1968.

The Study, which projected both benefits and costs over the life of the project, found that a breakeven point, when total cumulative benefits would begin to exceed total cumulative costs would occur as early as 1982.

When measured against the total costs to the local jurisdictions only, the benefits were found to amount to $8.80 for every local dollar invested in the adopted system.

Dollar values were set primarily on the basis of average hourly wages times hours saved by shortening the trip to work either by riding mass transit, or by driving in less congested traffic as more riders are diverted from automobile to mass transit. Automobile operative costs, parking, insurance costs and additional vehicle costs were based upon average regional costs for such services. Savings to the trucking industry were based upon average trucking wages in the region times hours saved by travel in less congested traffic.

Using average regional figures for costs of travel time and other travel costs, such as parking and travel times by mode of travel generated in the current Net Income Analysis, Development Research Associates projected cumulative net work trip travel time and travel costs using a computer program tested in previous rapid transit studies for Seattle, San Francisco and Los Angeles through the year 2020. The technical report is available for review from WMATA.

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The method for projecting mass transit benefits is based upon methods for calculating highway benefits and does not, therefore, include beneficial station impacts. It should be noted that this cost-benefit analysis is therefore very conservative in terms of its scope in that it is limited to travel costs, including primarily the cost of travel time. It does not include the projected economic impact of the rapid rail system upon land values in the region and specifically near rapid rail stations.

Based upon increases in land value stimulated by rapid rail systems in Toronto, San Francisco and Montreal, it has been estimated that in the Washington Metropolitan area, the projected potential impact of Metro by 1980, will be an additional $1 billion in property value, an additional $20 billion annually in tax values, an additional 1.3 million square feet in retail space, 14 million square feet of office space and 56,000 additional apartments.

Conservative estimates suggest that the area will receive a $3 return for every dollar invested in building the system.[1]

In addition to the long-term benefits resulting from reduced automobile traffic, the high volume of Metro ridership will have an impact on traffic and circulation patterns around stations. The mode of arrival and departure is an important consideration in this regard.

Table 21: Mode of Arrival for Metro System for 24-Hour Period in 1990

	Number	%
Walk	453,476	47.3
Bus	446,585	46.6
Drive & Park	29,208	3.0
Auto Passenger	5,852	.6
Kiss-n-Ride	23,839	2.5
TOTAL	958,960	100.0

Source: WMATA, NIA, 1969.

Note: Updated figures for this table are not yet available from the 1974 Net Income Analysis.

[1]WMATA "Real Estate Values and Metro", 1969,

For the entire Metro system, mode of access to and from stations is fairly equally divided between walking and buses. Approximately 47.3% of the Metro passengers are expected to walk to the stations, 46.6% are expected to use buses. Stations serving downtown Washington are expected to have over 90% of the passengers arriving on foot and 9% by bus. Auto and bus access and access by bicycle will be more prevalent in suburban stations.

As a result of the differences in modes of access, circulation of automobile traffic generated by Metro is not expected to be a major problem in the central business district. In outlying areas, where parking will be provided in conjunction with Metro stations, increases in automobile and bus traffic can be expected.

WMATA has contracted with transportation engineering firms to prepare external traffic circulation studies for stations with parking, bus bays and kiss-and-ride facilities. Each station area is analyzed in terms of the following factors:

- existing traffic conditions, parking and land use in the station area;
- proposed plans for streets, highways and land use;
- projections of population and employment in the station area;
- projections of transit-oriented traffic;
- volumes, modes and directions of approach of transit-oriented traffic; and
- volume/capacity relationships of pedestrian and vehicular approaches to the transit station.

An assessment is then made of necessary street and traffic improvements. Alternate plans for traffic circulation are developed and tested based on the access and circulation needs of pedestrians, buses, and autos and the limitations imposed by the character and configuration of adjacent land uses. Based on these studies, WMATA is working with state and local jurisdictions to prepare parking and circulation plans for station areas and to coordinate Metro construction with local street improvements so that traffic circulation is handled properly and problems due to increased vehicular activity are minimized.

Community/Residential

Displacement is an important factor in measuring the effects of Metro on the residential areas adjacent to the system. Frequently large-scale capital improvements require removal of a substantial amount of housing, which negatively

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affects the availability of housing and produces hardship for those displaced. However, as illustrated on the following table, the number of households to be relocated by Metro construction is low when compared with the large scale of the project and with potential relocation requirements of alternative modes of transportation such as highways.

TABLE 22: Residential Relocation Required for Metro Construction

Jurisdiction	Total Households to be Relocated Number	Percent
District of Columbia	596	62.7
Arlington County	46	4.8
City of Alexandria	113	11.9
Fairfax County	18	1.9
Montgomery County	79	8.3
Prince George's County	99	10.4
TOTAL	951	100.0
Route		
A	48	5.0
B	155	16.3
C	127	13.3
D	271	28.5
E	168	17.7
F	92	9.7
G	36	3.8
H	0	0
J	0	0
K	54	5.7
L	0	0
TOTAL	951	100.0

Source: WMATA, June, 1975

Relocation will take place gradually over a period of approximately ten years; therefore, no substantial effect on the housing market is anticipated. To date, 207 households -- nearly a quarter of the total -- have been relocated. It is difficult to estimate the availability of relocation housing for the remaining households because of the length of the construction period, the geographic extent of displacement and changes in the real estate market in different parts of the metropolitan area over time.

Relocation studies completed on Metro segments under construction or scheduled for construction involve approximately 250 households. The following table gives a general breakdown of househol[1] characteristics.

[1]The characteristics of the households scheduled for relocation have been described using census block characteristics for age, income, and tenure, and they are reported in the series of volumes prepared by Wallace, McHarg, Roberts, and Todd for WMATA titled Environmental Studies of Alternate Routes, 1972 F.F.

*Relocation figures updated
*Footnote added

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Income Range	Total	No. of Bedrooms 0-1	2	3	4	4+
Low	183	168	8	4	2	1
Moderate	48	36	6	6	-	-
Above Moderate	23	19	2	1	1	-
TOTAL	254	223	16	11	3	1

Low and moderate income households displaced by Metro to date received priority in public housing and moderate-income developments, as is the policy for all eligible families and individuals displaced by public action. This priority treatment will continue throughout the relocation process. There has been an adequate supply of housing for middle and upper income households displaced to date by Metro.

Under the provisions of the "Uniform Relocation and Real Property Acquisition Policies Act of 1970", relocation feasibility studies must be made before land is acquired by public action. These studies are prepared for Metro routes on a segment basis, depending on the acquisition and construction schedule. Households to be displaced are surveyed for their housing needs and an assessment is made of available relocation housing which meets their needs. Acquisition cannot proceed without finding that adquate relocation housing is available.

The D.C. Redevelopment Land Agency (RLA) is handling relocation of households displaced by Metro in the District, thereby coordinating Metro relocation with that caused by other public projects. Such coordination helps schedule relocation so that housing problems in the District are not further intensified. WMATA's own relocation specialists are providing relocation services in other jurisdictions.

Relocation services and payments to households displaced by Metro include:

- Assistance in locating a new home or apartment (and, if eligible, help in getting into public housing or certificates of priority for moderate-income rental units).
- Payment of moving expenses.
- Additional payments if replacement housing costs are more than was paid for a comparable dwelling pricr to relocation.

In addition, each displaced family or individual is assigned a relocation counselor to assist throughout the relocation process. These and other services are described in the "WMATA Relocation Guide for Families and Individuals". WMATA's relocation program follows

the federal directives in the "Uniform Relocation and Real Property Acquisition Policy Act of 1970" and, as stated previously, is judged adequate both in terms of services and payments

A second significant consideration in evaluating the impact of a rapid transit system is the possibility of disruptive effects on adjacent residential communities. One problem which accompanies many transit systems is that of imposing a physical barrier through a community. In the case of Metro, however, this problem will be minimal since the system is either in subway or adjacent to existing railroad and highway rights-of-way. In some instances where Metro share an existing rail or road alignment, at-grade or aerial routes will reinforce already existing physical barriers between communities or districts. Metro's use of existing transportation corridors for surface construction insures that new barriers will not be created and that communities will not be severed.

The only significant short-term disruption to communities and neighborhoods will be that produced by construction activities. In the areas where the Metro alignment is aerial or surface, construction activities will be apparent, causing some traffic and pedestrian disturbance. Cut-and-cover construction will likewise produce short-term inconvenience. However, the benefits accruing to these communities over the long-term will overcome these short-term negative effects.

Metro will provide greater ease of movement into and out of downtown Washington and throughout the region, which will be an obvious positive impact for commuters. It will expand educational, recreational and cultural opportunities by providing access to residents of one area to the opportunities of an other area. Furthermore, over the long run, Metro service to many communities could mean an enhancement to some residential areas. For example, transit service could help newly developing areas such as Pentagon City and Crystal City along the C Route attain a greater proportion of residential development than they have had in the past. Older residential communities like Takoma Park along the B Route could profit from the stimulus provided by Metro service. Areas with more severe problems, such as Shaw which was affected by the 1968 riots, are expected to benefit substantially from rapid transit service and the development it generates. Metro service is also expected to reinforce residential assets of well-established communities such as Rosslyn and Foggy Bottom on the C Route. More detailed discussion of these future development potentials created by Metro is found under Land Use and Future Development.

In comments on the draft environmental report for the WMATA System, the Department of Agriculture noted that:

> "A balanced transportation system will encourage a more efficient use of both urban and agricultural land and thus either postpone or avoid the necessity of diminishing the use of a valuable natural resource--prime agricultural land. A flexible transportation plan can channel development into urban areas now underutilized or areas less valuable for agricultural production....
>
> Improvement in rural public transportation is a vital part of rural development programs. In rural areas, the elderly, the young, and the disabled are drastically cut off from medical, educational, and other essential services. Many of the rural poor cannot afford to own and operate a personal vehicle. Therefore, this aspect of the proposed program supports an important national objective which is to permit people to enjoy a rural life environment which they desire and not force them into a migration to urban areas where their problems of adjustment and their burden on society would be increased."

In conclusion, it is anticipated that the provision of a rapid transit system will have no major disruptive effects on community and residential activities apart from short-term disruption caused by construction and minimal displacement. The long-term benefits produced by the Metro system in relation to employment, accessibility, and future development will outweigh these short-term constraints.

Land Use and Future Development

The construction of a fixed rail rapid transit system constitutes an investment of public capital from which the Washington region anticipates a return that more than balances initial outlays. WMATA has had a study conducted to investigate the costs and benefits of the Metro system; this report concluded that the total cumulative benefits of the system were three times greater than the combined federal-local investment in Metro. Metro provides preconditions which are helpful to future economic development. Not only does it have a direct effect on transportation, but also it encourages private investment. Development facilitated by Metro will be a source of municipal revenue in terms of income, sales and property taxes. While new development requires additional public services and facilities, it also generates taxes which may be able to relieve the revenue squeeze now being experienced by many jurisdictions in the metropolitan area.

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One of the main reasons why Metro has been supported is that it is expected to spur development which will renew parts of the District. Downtown Washington in particular will benefit from investment encouraged by Metro service. For example, construction of the C Route will reinforce redevelopment currently underway along the K and Eye Street corridor. The D Route will strengthen incentives for investment in the southwest. The extensive network of Metro lines in the downtown core will stimulate further development and help the District maintain its economic viability relative to growing suburban centers.

Residential communities and neighborhood shopping areas in the District are also expected to benefit from the stimulus Metro will provide to new development. For example, the E Route through Shaw is viewed as a means to upgrade the 7th Street area which was affected by the 1968 riots. Similarly, construction of the D, G and F Routes will help stimulate development in the southeast and far northeast. Older communities in the northwest and northeast, where problems are not severe, could also benefit from the improvements generated by the A, B and E Routes.

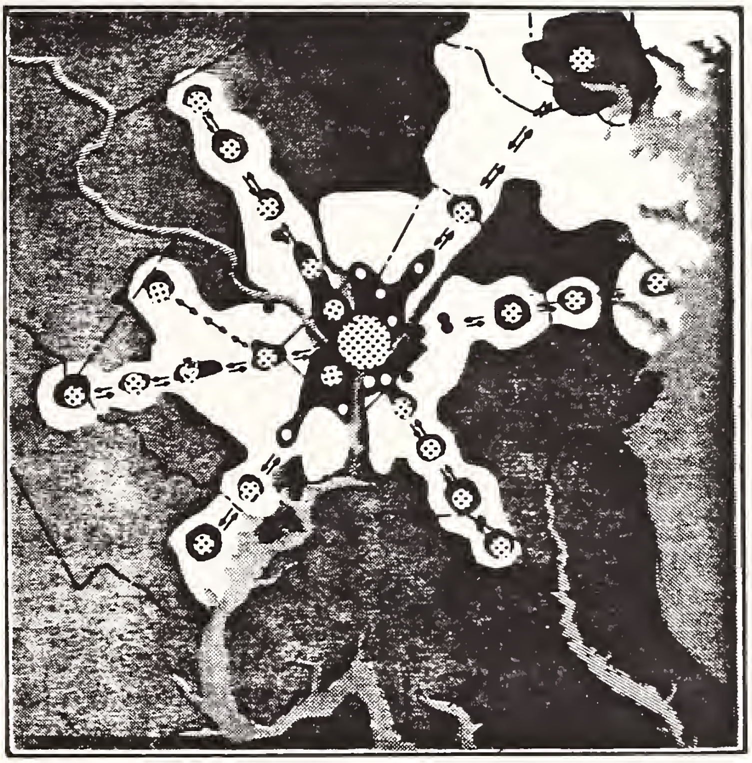
A second reason that Metro has been advocated is that it is expected to promote more orderly development than that which has occurred in the past. During the last two decades, the Washington region has grown rapidly. The extensive network of highways and major thoroughfares has served many parts of the region equally well. As a result, the typical suburban pattern of development has spread. There has been little incentive to develop corridors intensively while retaining wedges of open space.

Metro is expected to influence this pattern to some degree. While low density suburban development will continue, Metro service along corridors will enhance the growth potential of the corridors, and in terms of transit, make the wedges comparatively less accessible to future growth.

Several areas serve as illustrations of Metro's potential for channeling new growth along corridors. Construction of the C Route in Virginia will encourage additional investment in Rosslyn and the new developments located in the Jefferson Davis corridor. The K Route will help concentrate future development along the Rosslyn-Vienna corridor, thereby relieving growth pressures on the more rural areas of Northern Virginia. The A and B Routes are expected to serve similar functions in Montgomery County, Maryland. The D, E and F Routes will provide a focus for growth in Prince George's County. Without a focus, the impact of growth in these areas could be less manageable.

Metro alone, however, cannot be expected to successfully implement the region's wedges and corridors policy and local development objectives. In addition to land use regulations designed to promote more intensive, well-planned development around Metro stations, there is also a need for reevaluation of zoning regulations and property tax policies in terms of their ability to limit or control development. This is particularly critical for land to be retained for open space or very low density residential development. While areas immediately adjacent to Metro stations will be the first to experience heightened development pressures, areas in the vicinity of access routes to Metro stations should also feel the impact. In many cases, growth trends unaccelerated by Metro are already affecting these areas. Zoning revisions, changes in tax policies, or new land regulations may be necessary for further control of development. Public acquisition of open space should also be encouraged before this accelerated growth occurs. The need for a review of planning and land regulations is especially necessary in areas where Metro alignments follow floodplains requiring protection from extensive development. The potential impacts, particularly from development occur-

RADIAL CORRIDOR PLAN



New Town Center

Urbanized Area

Sub-Center

Main Communication Line

Controlled Open Space

Source: A Plan for the Year 2000, The National Capital, NCPC and NCRPC

Map 4

ring due to Metro location, but over which WMATA has no control, are critical.

The extent to which WMATA can influence the land use and future development along its routes and around Metro stations is limited by the powers and authority granted to it by Congress and the State and District governments.

WMATA may only acquire property which is necessary or useful in rendering transit services. It cannot acquire land or improved property beyond that actually needed for transit, in order to control development around Metro stations. However, WMATA policy has been to acquire whole parcels under single ownership, where part of the parcel is necessary for Metro and the remainder of the parcel would be of a size or shape that would make it difficult to develop.

If it is determined that there is an excess of property beyond that required for transit, including developable air rights above Metro stations, these properties can be disposed of by WMATA and developed in accordance with local plans and controls. Additional controls could be imposed by WMATA, but have not heretofor been established for their properties. WMATA policy is to offer local governments the first rights to the purchase of such properties.

The summary report entitled, "Metro Property Utilization" by Larry Smith and Company, Ind. suggested to the Authority ways and means of benefiting from excess land originally acquired.

- The lease or sale of air rights over stations built below grade;
- Development rights in or over areas originally acquired for the purposes of Authority parking, but later found too valuable as a result of increasing land values; (required parking capacity to occur via multi-level parking structures);
- Lease or sale of land acquired in the immediate vicinity of the station.

Other than through controls on its own property, WMATA cannot dictate or otherwise directly influence the use of land or zoning around its stations. Master plans or sector plans are prepared by local planning agencies and adopted by the governing body of the jurisdiction. Zoning ordinances are likewise the exclusive responsibility of local governments. Some local governments have established informal procedures for WMATA staff review and comment on master plans during their preparation and of applications for rezoning. These procedures allow for closer coordination between WMATA and local jurisdictions with respect to land use and development.

The land use policies of the local governments affected by Metro are generally reflected in the policies of the WMATA Board. The Board is made up of appointed representatives from the Northern Virginia Transportation Commission, including those from each suburban Washington jurisdiction in Virginia and the Virginia State Highway Commission; the Washington Suburban Transit Commission, including those from the two suburban Maryland counties and the Maryland Department of Transportation; and the District of Columbia government. Therefore, the WMATA Board members, many of whom are elected officials, are serving their local governments in their appointed capacity.

Master plans for Montgomery County communities, which have been prepared by the Maryland-National Capital Park and Planning Commission since the adoption of the Regional Metro System, reflect the joint policies of the local governments and WMATA. For example, the North Bethesda-Garrett Park Master Plan indicates a special Transit Development Zone around each Metro station, and proposes special mixes of use and density variances in conjunction with Metro service. The Transit Impact Zoning proposed by the county planners is an attempt to implement this master plan recommendation. WMATA staff is expected to participate in the review of zoning applications submitted under this new zoning when the classification is adopted.

Other established local policies related to Metro have influenced the design of facilities for Metro stations, and the location of several stations. Parking around Metro stations in the District of Columbia has been reduced, due to the policies of the City. Stations, such as Braddock Road in Alexandria, have been moved several blocks at the request of local government. If changes in the Adopted Regional System requested by local government involve extra cost, however, it is established WMATA policy that the local government bear the additional cost. Some changes in response to local land use and development problems around Metro stations have been made as a result of cooperation with special interest groups. For example, the Oklahoma Avenue Station, above the Stadium Armory Station, was removed from the system because of the opposition of a local citizen's group. In general, all final station locations and their related facilities are subject to public hearings, and approval by the local government affected. The Master Agreements between WMATA and local governments also specify that WMATA shall submit plans for local government review and approval. These procedures are described at the conclusion of Section 4 of this Appraisal.

More detailed procedures have recently been established by the District of Columbia for the City Council to instruct its WMATA Board Members how to vote on issues raised in the public hearings and reported on by the District Office of Planning and Management.

WMATA's role in assuring the adequacy and appropriateness of local planning and zoning controls around Metro rapid rail stations is one of providing information through a series of informal and formal meetings with local governments and presentations to the public concerning each station. It is during this process that secondary impacts of each station are examined at length. A summary of the process is set out on pages 145-147 of this study.

In summary, the role of planning for land use and development around Metro stations belongs to the local governments, because they exercise the only controls over it, except for those state controls on certain aspects of development affecting water resources. Therefore, the responsibility for the environmental impact of the future land use and development also belongs to the local government. The local governments in the Washington region recognize this responsibility and are proceeding with detailed studies to enable them to act knowledgeably.

WMATA participates in the process of formulating appropriate controls through its early and contriving provision of information concerning proposed station development, projected station impacts, and potential instigating actions.

With the assistance of a major grant from the U.S. Department of Transportation, Urban Mass Transit Administration (UMTA) to the Metropolitan Washington Council of Governments (WASHCOG), the State and local governments in the region have developed specific work programs for Transit Station Access and Impact Studies. A discussion of the UMTA-WASHCOG sponsored studies and the responsibilities of the government agencies involved is located in Section 4, with the discussion of regional and local planning for Metro.

Specific policies set out in the re-examination of the WASHCOG Year 2000 Policies Plan of January, 1974 that bear an important relationship to the Metro Regional System are presented below:

GENERAL DEVELOPMENT PATTERN. The locationof new communities in corridors radiating from the central area, as generally recommended in the Report of the National Capital Planning Commission and the National Capital Regional Planning Council, should be the basic future land development concept for the National Capital Region, based on the prospect that the Region's population will approximate 5 million within the next forty years.

COMMUNITY CENTERS. A concentration of the widest possible variety of employment, shopping and recreational opportunities should be planned at the center of each new community of 75,000 to 150,000 population. The location and layout of the center should be carefully planned in relation to the physiographic features, freeway interchanges, the ar-

*new Paragraphs Added

terial street system, rapid transit stations, and the residential density pattern.

METRO-CENTER. As defined in the Year 2000 Policies Plan Report, the Metro-Center should be encouraged to grow and develop as the dominant daytime population center within the region. The increase in Federal employment in Metro-Center should be limited to about 50 percent during the next four decades, requiring two-thirds of the expected increase in the Federal employment in the National Capital to be located elsewhere within the Region. The design of new construction within Metro-Center should be carefully executed to limit the extension of Metro-Center while preserving its character of openness.

TRANSPORTATION. Planning to meet future transportation requirements for the Region should provide for a coordinated system including both efficient highway and mass transit facilities, making full use of the advantages of each mode of transportation. Major thoroughfares and rapid transit lines should be located so that they will support the high density residential and commercial areas planned for each section of the Region, especially the centers of new communities in the radial development corridors. Every effort should be made to encourage the use of public transit in hours of peak traffic loads especially for trips to and from Metro-Center and other radial trips, including the designation of exclusive rights-of-way for express buses to supplement the proposed subway system.

Specific policies include the following, to:

.encourage immediate improvement of extensive radial transit service complementing Metro with busways and commuter rail;

.promote long-term expansion of higher levels of transit service including both <u>radial</u> and <u>circumferential transit</u>;

.specify general location and density of development permitted in wedge areas;

.use public utilities policies to preserve wedges;

.avoid overconcentration of employment in Core Area while assuring full employment opportunities for its citizens;

.encourage concentration of employment growth in selected centers to support balanced communities while providing for limited specialization of certain economic activities;

.encourage household locations and densities which preserve and protect amenities and natural resources of the region.

NEW

The following section is a review of those publicly owned lands which may be affected by Metro construction and/or operation. These include public parks, recreation areas, wildlife refuges, historic and archeological sites of federal, state or local significance.

In the planning and design of the Metro system, WMATA has attempted to avoid the use of parkland, historic places or archeological sites for transit or related facilities. In those cases, however, where no feasible alternative to such use could be provided, WMATA's policy has been to minimize any potential adverse environmental impact on the area to be used.

With regard to parklands and historic places, provisions for minimization of impact have been made through master agreements between WMATA and the National Park Service and local jurisdictions, through WMATA contract specifications for construction, and through design of shared transportation rights-of-way.

Master agreements, notably that between WMATA and the National Park Service, impose strenuous conditions under which transit or related facilities may involve or affect parkland or historic places. The National Park Service Agreement with WMATA calls for consultation and coordination between the two agencies from the preparation of initial alternative plans through to their final design. In the application for and issuance of permits for parkland use, information regarding the nature and extent of work, the possible impact of the action on the site, and plans for redesign, reconstruction and relandscaping of the site will be considered. WMATA is responsible for aesthetically agreeable temporary facilities, safety and access of parkland during construction, prevention of unnecessary damage and pollution, and horticultural maintenance and replacement of areas affected by Metro activities. For permanent use of parkland, WMATA must replace it with suitably located lands to provide comparable public service. More specific information on the National Park Service Agreement an example of master agreement with jurisdictions are contained in Appendix B in Part 3 of this statement.

WMATA contract specifications are designed to uphold the master agreements and to assure contractor compliance with the standards set for the regional system. These include protection of existing vegetation and structures, cooperation with National Park Service in regard to permits and protection of park property, and precautionary measures to avoid drainage problems and pollution.

The sharing of transportation rights-of-way minimizes additional environmental impact attributable to Metro activities. Metro alignments such as the K and E

Routes follow proposed highway rights-of-way, in these cases I-66 and I-95, respectively. The J, H and E Routes follow the existing RF&P, Southern and B&O railroad corridors. Use of designated transportation corridors reduces potential additional adverse impact on the surrounding areas, including the parklands through which the transit system may pass.

Parklands and historic sites and buildings have been located by obtaining lists and maps from state, county and local agencies. Sites on the National Register of Historic Places were located from the most recently published list. For the District of Columbia, the National Capital Planning Commission (NCPC) has published the report, Downtown Urban Renewal Area Landmarks, Washington, D.C., based upon the inventory by the Joint Committee on Landmarks. In addition, NCPC has prepared maps and supporting lists of historic landmarks outside of Urban Renewal Areas.

For the historic sites and landmarks identified in the District portion of Metro routes, the three categories established by the Joint Committee are indicated in the impact description. These categories have been identified as follows by the Joint Committee:

> "Category I: Landmarks of great importance which contribute significantly to the national cultural heritage or that of the District of Columbia and its environs, and which must be preserved.
>
> Category II: Landmarks of importance which contribute significantly to the cultural heritage or visual beauty and interest of the District of Columbia and its environs, and which should be preserved or restored, if possible.
>
> Category III: Landmarks of value which contribute to the cultural heritage or visual beauty and interest of the District of Columbia and its environs, and which should be preserved or restored, if practicable."

On March 8, 1968, the Joint Committee issued a revised list of Category I and II landmarks in the National Capital and recommended them for inclusion on the expanded National Register of Historic Places provided for in the National Historic Preservation Act of 1966 (P.L. 89-665). Category III landmarks were recommended for further study and possible nomination to the National Register at a later date.

In the case of archeological sites, discussions with Dr. Charles McNett of the Department of

Anthropology, The American University, revealed that on a regional level the Metro system poses minimal potential impact on documented archeological sites. This is because the system closely follows existing rights-of-way and thus is usually further than one-half mile from such sites. However, where Metro activities are in close proximity to existing sites, such as Rose Hill Quarry off Connecticut Avenue (A Route), previous development has usually disrupted the area substantially. No additional threat to the site is posed by Metro activities. Provision has been made in WMATA contract specifications for Historical and Scientific Specimens.

> "All articles of historical or scientific value, including but not limited to coins, fossils, and articles of antiquity, which may be uncovered by the Contractor during the progress of the work shall become the property of the Authority. Such findings shall be reported immediately to the Engineer who will determine the method of removal, where necessary, and the final disposition thereof."

WMATA has established a system of cooperation with the Advisory Council on Historic Preservation and the Historic Preservation officers in the affected jurisdictions whereby detailed review and study of potential impacts of any alignment section is carried out at the time of Final Plans. This review schedule allows the most efficient coordination of the Metro design effort and the historic preservation effort at the time in the Metro design process when impacts can be most accurately identified and design modifications to avoid or minimize such impacts can most readily be made. Part III of this Study, the Appendices sets forth additional details of such impacts and of the review process.

At the time of final plans, WMATA shall hire the services of an architectural historian to survey each alignment to determine the location of any historic sites that may be eligible for the National Register and shall include any such sites in the detailed review of potential impacts by the Advisory Council on Historic Preservation and the preservation officers of the affected jurisdiction. The review process is designed to respond to the requirements of Section 106 of the National Historic Preservation Act of 1966 and Section 4 (f) of the Department of Transportation Act and the Federal Aid Highway Act of 1968.

*New third paragraph

Required review of parkland impacts by Metro by the National Capital Planning Commisssion is described in detail in Appendix B in Part III of this Report, Appendices.

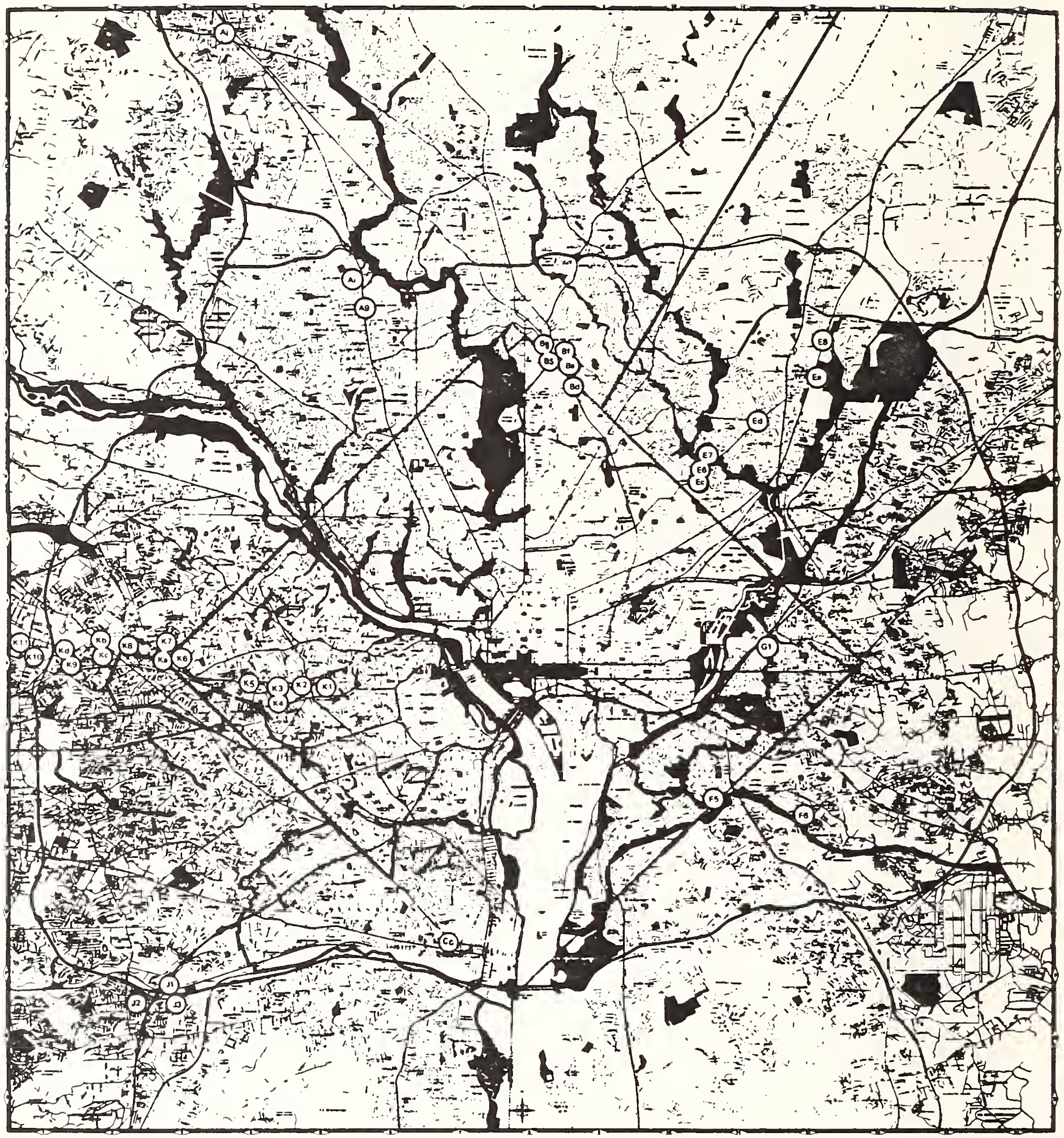
It should be noted that the Department of Transportation Act and the Federal Aid Highway Act of 1968 both provide as follows in Section 4(f):

> "It is hereby declared to be the National policy that special efforts should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and water fowl refuges, and historic sites.... After the effective date of the Federal Aid to Highway Act of 1968, the Secretary shall not approve any program or project which requires the use of any publicly-owned lands from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, State, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use."

This requirement applies to any portion of the Metro system receiving assistance through the Urban Mass Transportation Administration.

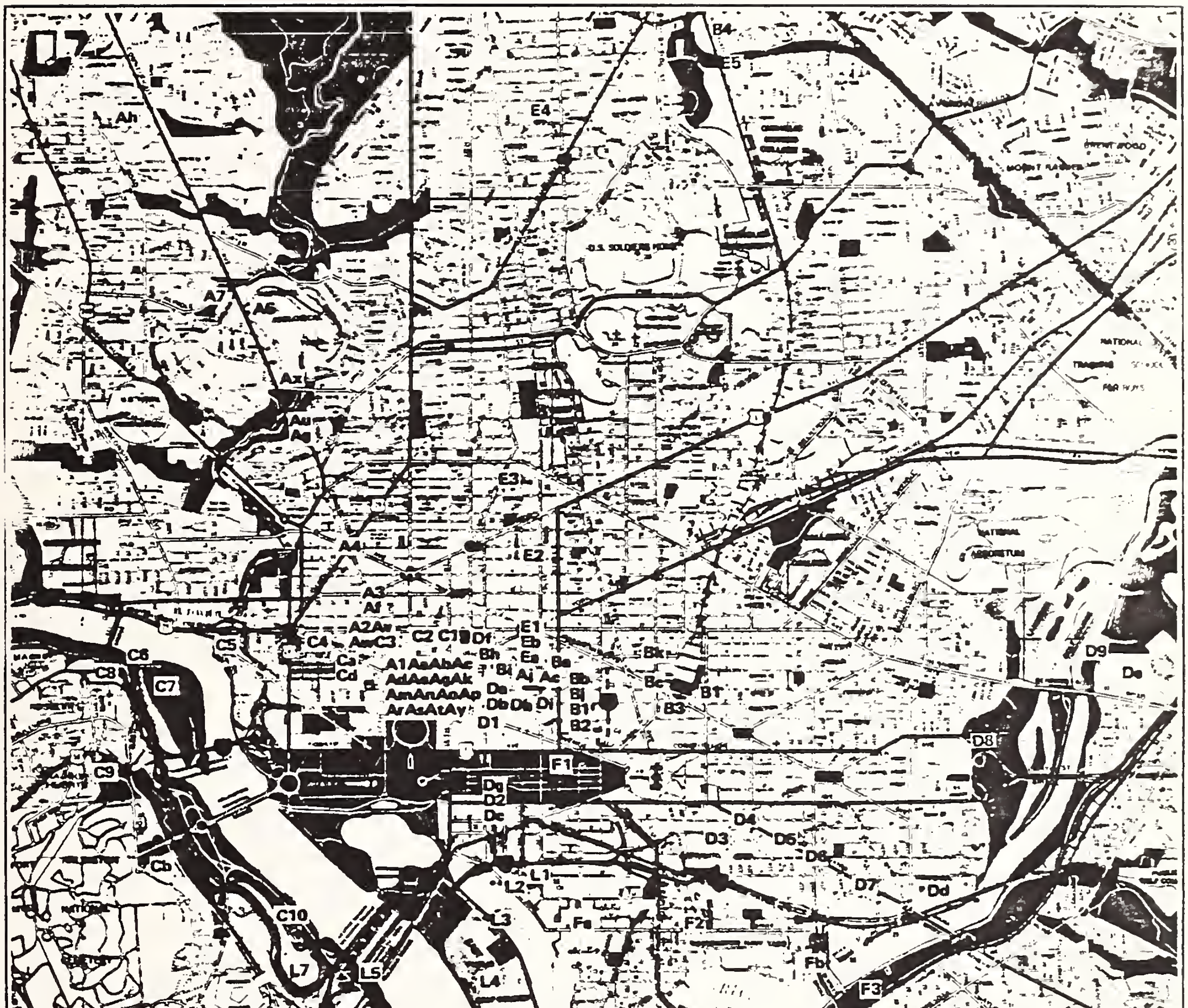
Individual detailed 4(f) studies of each such potential impact noted throughout this Study will be prepared for each alignment section at the time of preparation of Final Plans. Accounts of the evaluation of the feasibility of alternative systems and alignments and of the impacts of each alternative are presented in this study and in the route environmental studies available from WMATA.

The following maps illustrate the location of parkland, historical and archeological sites along Metro routes. A route by route description of potential impacts follows and is keyed into the maps.



PARKLANDS AFFECTED BY METRO IN METROPOLITAN AREA

Map 5



PARKLANDS AFFECTED BY METRO IN DOWNTOWN WASHINGTON

MAP 6

A Route Parklands

A1 Lafayette Square
A2 Farragut Square
A3 Longfellow Square
A4 Dupont Circle
A5 Rock Creek Park
A6 National Zoological Park
A7 Klingle Valley Creek and Park
A8 Tenley Circle
A9 National Institutes of Health/Naval Medical Center

A Route Historical and Archeological Sites

Aa Epiphany Church
Ab Colorado Building
Ac Riggs National Bank/American Security and Trust Co.
Ad U.S. Treasury Department
Ae U.S. Chamber of Commerce
Af Mayflower Hotel
Ag Taft Bridge
Ah Rose Hill Quarry
Ai Temple Hill Baptist Church
Aj Rockville Station of the B&O RR/St. Mary's Church
Ak Decatur House
Al National Savings and Trust Co.
Am Penwick Gallery
An St. John's Church
Ao Dolly Madison House
Ap Blair Lee House
Aq Benjamin Ogle Taylor House
Ar St. John's Parish House
As Folger Building
At Playhouse Theater
Au Rock Creek Park
Av Washington Club
Aw Wadsworth House
Ax National Zoological Park
Ay Lafayette Square

B Route Parklands

B1 Judiciary Square
B2 Memorial To Gen. Pike
B3 Union Station Plaza
B4 Fort Totten Park
B5 Jesup Blair Park

B Route Historical and Archeological Sites

Ba Adas Israel Synagogue
Bb Pension Building/St. Mary's Church
Bc City Post Office
Bd Benjamin Gilbert House
Be Jesup Blair House
Bf Montgomery Community College
Bg Silver Spring
Bh St. Patricks
Bi National Portrait Gallery
Bj Old City Hall
Bk Government Printing Office
Bl Union Station

C Route Parklands

C1 Franklin Square
C2 McPherson Square
C3 Farragut Square
C4 James Montore Park
C5 Rock Creek and Potomac Parkway
C6 Thompsons Boat Center
C7 Theodore Roosevelt Island
C8 George Washington Memorial Parkway
C9 Iwo Jima — U.S. Marine Memorial
C10 Lady Bird Johnson Park

C Route Historical and Archeological Sites

Ca 19th St. Paptist Church/James Monroe House
Cb Arlington National Cemetery
Cc George Washington Masonic Temple
Cd Arts Club of Washington

D Route Parklands

D1 Post Office Park
D2 The Mall
D3 Folger Square
D4 Seward Square
D5 U.S. Res. 44, 45, 48, 49
D6 U.S. Res. 41-A, 41-B, 44-A, 47-A, 47-B, 50-A, 51-A, 52-A, 53-A
D7 U.S. Res. 255
D8 Anacostia Park
D9 Anacostia Park — Watts Branch

D Route Historical and Archeological Sites

Da Woodward and Lothrop/Old Evening Star Building
Db Old Post Office and Clock Tower
Dc Smithsonian Institution/Freer Gallery
Dd Congressional Cemetery
De Archeological site of Indian Campsite
Df Franklin Square
Dg Capitol Mall
Dh Department of Agriculture
Di St. Dominic's Church
Dj Old Naval Hospital

E Route Parklands

E1 Mt. Vernon Square
E2 JFK Playground
E3 U.S. Res. 170
E4 Sherman Circle
E5 Fort Totten Park
E6 Sligo Park
E7 Kirkwood Recreation Center
E8 Indian Creek Park

E Route Historical and Archeological Sites

Ea Special Block
Eb Public Library
Ec Site of Potential Archeological Interest
Ed Deakins Hall and Cemetery
Ee College Park Airport
Ef Christian Heurich Memorial Manson

F Route Parklands

F1 Mall
F2 Playground — 1st & M Sts./Navy Yard
F3 Anacostia Park
F4 Fort Stanton Park
F5 Suitland Parkway
F6 Naval Oceanographic Complex

F Route Historical and Archeological Sites

Fa Wheat Row
Fb Archeological Sites of Indian Campsites
Fc National Archives

G Route Parklands

G1 Fort Mahon Park

H Route

No parkland, historical or archeological sites

J Route Parklands

J1 Backlick Stream Valley Park
J2 Trailside Park
J3 Proposed Park Area

J Route Historical and Archeological Sites

None

K Route Parklands

K1 Quincy Playfield
K2 Lacey Wood Park and Playground
K3 Westover Playground
K4 Bon Aire Park

*Historic Sites Added

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K5 Madison Manor Park
K6 Stuart Arts Center
K7 Mount Daniels School
K8 George Mason High School
K9 Fairfax County Elementary School Site
K10 Fairfax County Elementary School
K11 George C. Yeonas Park

K Route Historical and Archeological Sites

Ka Original Cornerstone
Kb Hollywood Farms
Kc Highland View
Kd The Mount

L Route Parklands

L1 Jefferson Recreation Center
L2 Park No. 2, Southwest Redevelopment Area
L3 Yacht Club Slips
L4 East Potomac Park
L5 George Washington Memorial Parkway
L6 Roaches Run Waterfowl Sanctuary
L7 Pentagon Lagoon

L Route Historical and Archeological Sites

None

A Route: Parklands

Parkland, wildlife and recreation areas along the A Route include national landmarks, formal urban parks, triangles and medians in streets, and large open parks and public land. In all cases, the use of parkland has been avoided if possible or minimized where necessary.

Treasury Department

The Treasury Department Building, a National Register and Category I landmark at the corner of Pennsylvania Avenue and 15th Street, N.W., is designated both as parkland and historical site. It will be discussed under the section on A Route Historical Sites.

Lafayette Square

Lafayette Square (A1), a National Register and Category I large formal urban park immediately across from the White House between Madison and Jackson Places and Pennsylvania Avenue and H Street, N.W., is traversed on a southeast-northwest axis by Metro. Because the subway is in earth tunnel, it's impact is minimal in the area of the Square. Some mature trees will be lost in the sidewalks at the northeast corner of the park for vent shafts.

Farragut Square

A second formal urban park is Farragut Square (A2), located between Eye and K Streets at 17th Street and Connecticut Avenue, N.W. Here again, earth tunnel construction minimizes impact on the square. However, adjacent cut-and-cover construction may cause the loss of some mature trees in the northwest corner of the park as well as short-term major visual and traffic and moderate noise disruption in the area.

Triangles (U.S. Reservation Nos. 150 and 150A)

Triangle No. 150, known as Longfellow Square (A3) and No. 150A are located at 18th and MStreets and at 18th and N Streets, N.W., respectively. Tunneling under both of these parcels will have no effect on these parts.

Dupont Circle

Rock tunnel construction will preserve the specimen trees and parks of the Dupont Circle area (A4), which is a Category III landmark. There will be no effect to this area as the station will be constructed in rock with no surface penetration. The station entrances will be constructed in private property.

*Third paragraph revised; fifth and sixth para. revised and expanded

Rock Creek Park

Construction of the A Route involves the southern half of Rock Creek Park (A5), a Category I landmark in the area of Taft Bridge at Connecticut Avenue, N.W. Much of this immediate area is being utilized as a staging/storage area. It will also serve as the removal point for rock spoil produced by tunnel construction along the A Route within the immediate vicinity. Within this section of the A Route, any other site selected for spoil removal probably would have necessitated the taking of houses.

Although the staging/spoil removal site represents a significant intrusion, the park will be restored as closely as possible to its condition prior to construction operations. Use of the park area for staging and spoil removal operations will require the removal of forest tree and ground cover. Erosion and sedimentation control measures will be implemented to prevent erosion from spoil storage and bank erosion of Rock Creek, due to the increased runoff and construction activity adjacent to the Creek channel. Further, the creek valley's value as a wildlife habitat and corridor and as a visual resource will be disrupted by removal of forest cover and increases in construction noise.

Metro has constructed a bicycle/hiking path through the staging area to maintain the continuity of the park. This compensates to some degree for reductions in public access to this portion of the park during Metro construction.

Two specific areas of impact near the bridge are the stables and a substation site. New and temporary stables have been built in an alternate location, designated by the NPS. Once construction is complete, the old stables may be used again. Substation construction took a minor amount of parkland near Belmont Road; a few mature deciduous trees on the site were lost, and the area has been restored and landscaped.

National Zoological Park

The National Zoological Park (A6), a Category III landmark located on Connecticut Avenue, N.W., will be affected by Metro activities. A fan shaft will be located in public space but during construction, a construction easement will be required in the adjacent zoo grounds between the automobile entrance and Jewitt Street. Also, partly within the zoo grounds, between Jewitt Street and the automobile driveway, a chiller plant will be constructed, requiring the removal of several trees and a ground cover. The area will be landscaped with plantings to screen the site from public view.

Klingle Valley Creek and Park

Klingle Valley Creek and Klingle Valley Park (A7) are located north of the zoo at Connecticut Avenue, N.W. The proposed location of grounding mat will modify the

*Fourth, fifth, and sixth paragraphs revised and expanded

channel of the creek and cotrol measures will be necessary to prevent sedimentation and siltation problems. The character of this portion of the natural stream valley will be modified by the construction operations. Construction will also involve a minor short-term loss of parkland.

Melvin C. Hazen Park

Melvin C. Hazen Park is located south of Sedgwick Street, N.W., and east and west of ConnecticutAvenue. A small area being used by local citizens for flower and vegetable gardens will be required to install a grounding rod mat three (3) feet below the surface. There will be little affect to the gardens as the grounding mat will be installed during the winter and the area restored prior to planting season.

Tenley Circle

The A Route alignment will be located to the northeast of the circle. Construction will be of the rock tunnel type; therefore, impacts related to Metro will cause only negligible impact on the area (A8).

Fort Drive Park (U.S. Res. 542)

Fort Drive Park is located between Fort Reno Park and Tenley Circle connecting the two sites. It is parallel and adjacent to 40th Street, N.W. A strip on the west side which is a Park Service street will be closed and the portion between Albemarle and Brandywine Streets will be used for bus circulation and "kiss'n'ride" passengers for the Tenley Circle Station. The affect on the park will be minimal as the grassy area will remain and 40th Street adjacent will be available to the public.

National Institutes of Health and Naval Medical Center

Two major areas of regional importance both from a vegetation as well as wildlife standpoint are the National Institutes of Health and National Naval Medical Center complexes (A9). Both federal organizationa front on the A Route where their combined property represents a regional resource in natural topography, a rolling stream valley, vegetation, hardwood shade trees and wildlife habitat. The alignment itself passes through the area in rock tunnel.

The new location of the Medical Center Station causes the minimum possible environmental impact due to its location in relatively flat areas of the site without significant vegetation. The plan makes possible the continuity of the stream channel as it flows through the site. Previously considered alternatives would have caused major destruction to both the areas of major mature vegetation and the stream channel. Parking in the vicinity of the station may be provided by NIH in accordance with its new master plan before the station is completed. A fan shaft and a vent shaft will be located on the edge of the National Naval Medical Center grounds in open space. The

*First and third full paragraphs added; fifth paragraph expanded

vent grates will be flush with the ground and the area landscaped after completion. The visual and audio effects will be negligible.

Rock Creek Park in Montgomery County

A small section of Rock Creek Park in Montgomery County adjoining and to the east of Rockville Pike below the proposed Grosvenor Station site would be impacted by Metro. The A-13 section alignment would traverse a short section of the park along and parallel with Rockville Pike on an aerial structure, requiring 3,401 square feet of permanent aerial easement, 992 square feet of permanent underground easement, 9,437 square feet of temporary construction easement, and 5,016 square feet of utility easements. The underground easement would be for a column footing to support the aerial structure, and the structure itself would be 35 feet above the ground.

This section of the park has not been developed for recreational purposes. These easements are on the boundary of the park and would not disrupt the existing open space or proposed recreational activities.

A Route: Historical Sites

The A Route passes through an area of Wahington rich in landmarks of national and local significance. Every effort is being made to avoid adverse impact on them.

Cut-and-cover construction will cause minor short-term disruption to pedestrian traffic and noise levels in the vicinity of Epiphany Church (1843), a Category II and National Register landmark located at 1317 G Street, N.W. (Ab).

Again, at the corner of 15th Street and Pennsylvania Avenue, N.W., the Riggs National Bank (1898) and the National Savings and Trust Company (1888), both Category II landmarks and National Savings a National Register Historic Place, will experience minor short-term disrup-

tion of pedestrian traffic and increased noise levels (Ac).

The Treasury Department (Ad), the National Register and Category I landmark located on Pennsylvania Avenue at 15th Street, N.W., has experienced minor short-term disruption during construction, with some slight settling occurring in its courtyard, but has been fully restored to its original condition.

At 1615 H Street, N.W., the U.S. Chamber of Commerce (1925), a Category III landmark, may have a short-term pedestrian and traffic problem at the building's entrance due to construction activities (Ae).

Located along cut-and-cover construction, the Mayflower Hotel (1924), also a Category III landmark at Connecticut Avenue and DeSales Street, N.W., will experience short-term disruption in front of the Hotel with construction of a vent shaft in the sidewalk. Although part of an adjacent building will be taken, no permanent impact on the Hotel is foreseen (Af).

Crossing the Rock Creek Park on Connecticut Avenue, N.W., is the Taft Bridge (Ag) built in 1908, a Category III landmark. The Metro alignment across the Park will have a negative visual impact on the area during construction.

Rock Creek Park itself and the National Zoological Park are both considered as significant landmarks, but are discussed under A Route Parklands.

Immediately beyond the National Institutes of Health is the Temple Hill Baptist Church (Ai). Tunnel construction in this area should minimize any potential impacts to the building.

Although the A Route alignment proceeds in railroad right-of-way near and in Rockville, the widening necessitated by the additional Metro alignment may take the historic Rockville Station of the B&O Railroad (Aj). Built in circa 1875, it is still in use as a freight depot and remains a noteworthy example of Americana. The location of the storage yard facilities for A Route fixes the present alignment, thus requiring either the moving or demolition of the station. The area is under study, but responsibility for initiating action to save the station now rests with the railroad or the local government. Alternatives would involve more significant impacts on residential and commercial property. In the immediate vicinity, too, are St. Mary's Church (1815) in Gothic Revival style and a small historic hardware store, both of which may be affected by the widening of the B&O alignment to accommodate Metro tracks.

A Route: Archeological Sites

The only archeological site in the immediate area of the A Route is the Rose Hill Quarry (Ah). Excavated

in 1890, the Quarry is now located beneath an apartment building on Connecticut Avenue. No additional adverse impacts attributable to Metro are foreseen in this site. Should any finds be made, however, of archeological significance during construction, their removal and preservation will be provided for under WMATA contractual agreements.

B Route: Parklands

Parklands along the B Route vary from small street parks and local recreation areas to large open parks. The Metro has been aligned to minimize any adverse impacts on these areas.

Judiciary Square

At Judiciary Square (B1) between 4th and 5th and D and G Streets, N.W., a few large elm trees will be lost to cut-and-cover construction. This will be only a short-term disruption with restoration made of the park upon completion.

General Pike Memorial

The Memorial to General Pike (B2) located on a triangle at 3rd and D Streets, N.W. (U.S. Reservation No. 188) should not experience any Metro impact because all operations are in cut-and-cover tunnel at this point.

Union Station and Plaza

Between the Capitol Building grounds and Union Station, parkland will be disrupted by cut-and-cover construction, equipment storage and use as a staging area (B3). Excavation may cause potential sedimentation for which control measures will be required and equipment storage may cause compaction, possibly affecting the root systems of nearby trees. Short-term impacts will include visual disruption of the view to the Capitol, but long-term impacts will be minor. Vent shafts will take a few trees and occupy a portion of parkland at the eastern end of Union Station Plaza. Construction will also affect parkland in Massachusetts Avenue in front of the station by the loss of mature trees.

Fort Totten Park

Passing through Fort Totten Park (B4), the B Route crosses the E Route at Fort Totten Station. The Metro alignment makes use of the existing B&O Railroad right-of-way. Though widening of the right-of-way will take a minor number of trees, the major stands will be well back from any construction. Provisions are planned

*Third Paragraph Revised

for a pedestrian-bike connection under the railroad tracks where none now exists.

Fort Drive Park (U.S. Res. 497)

Fort Drive Park is located between Fort Slocum Park and Fort Totten Park along the west side of the B&O R.R. A narrow strip of this park is required for side slopes for the relocated inbound track of the B&O. Some small scrub trees (natural growth) have been removed. The area will be landscaped and returned to the National Park Service.

Piney Branch Portal (U.S. Res. 531)

Piney Branch Portal is located north and south of Piney Branch Road on the east side of the B&O R.R. A permanent surface easement along the west side of this park reduces its size slightly. Several small trees will be replaced and the area landscaped.

Jesup Blair Park

Just outside the District boundary is a large park by the name of Jesup Blair (B5). Because the B Route is located within the B&O Railroad right-of-way, any additional adverse impact is minimized to its facilities which include a community building, two auditoriums, picnic areas, playground, football field and handball courts. However, tennis courts adjacent to the alignment will be taken by Metro construction. They will be replaced at WMATA expense by the Maryland-National Capital Park and Planning Commission

B Route: Historical Sites

The B Route passes close to several historical landmarks, but in no case is there any significant adverse effect. An example is the Old Adas Israel Synagogue (1873-1876), a National Register and Category II landmarkswhich was relocated to a new site at 3rd and G Streets, N.W.

The Pension Building is a Category I Landmark and is located between 4th and 5th and F and G Streets, N.W. The route's tunnel, constructed by the cut-and-cover method, passes under a corner of the Pension Building premises close to the building. The area has been restored.

The Woodward and Lothrop Main Building (1901), a Category III landmark,at F between 10th and 11th Streets, N.W., is designated as an historically significant landmark. Both Woodward and Lothrop buildings will be connected to Metro Center Station by an underground passageway. Metro activities in the immediate vicinity will necessitate underpinning of the structures.

Union Station and Plaza, National Register and Category I landmarks, are in close proximity to the Metro alignment. The parkland in the Plaza area is discussed under B Route Parklands. Metro construction along the west side of Union Station has been planned specifically to avoid disruption of any landmarks in the immediate area.

*First paragraph expanded; fourth paragraph added

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his horse, found a spring sparkling with silver white sand. Located in an industrial area, the park should not be affected by the widening of the B&O Railroad alignment.

Also in Maryland, The Jesup Blair House (Be), a portion of the farm called "The Moorings", was established by Violet Blair Janin as a public park in memory of her father, Jessup Blair. The building, now used by the Selective Service, is adjacent to the proposed alignment, but is not affected by it.

Montgomery County College (Bf), utilizing some of the buildings of the former Bliss Electrical School, is directly adjacent to the B Route alignment. However, because it is in existing B&O right-of-way in this area, Metro should not pose any additional adverse impact.

B Route: Archeological Sites

There are no archeological sites of significance already documented along the proposed B Route. However, should any important archeological finds be made, work will be stopped in accordance with WMATA contractual agreements to provide for their preservation and removal.

C Route: Parklands

There are several types of areas involved in the construction of the C Route: city block parks, memorials, public parkland and road right-of-ways. The city parks are urban in character, not natural settings where ecological systems are functioning for plant and animal life. Thus, impacts to them that are temporary are easier to rectify after completion. In all cases where trees or plantings are removed, WMATA will replace in kind at the end of construction.

Franklin Park

This city block park is located between 13th and 14th Streets, K and Eye Streets, N.W. (C1). Trees include American elm, pin oak, red oak, willow oak, beech, horsechestnut, American basswood, magnolia and gingko and are in good to excellent condition. The only impact anticipated is disturbance at the periphery.

McPherson Square

This city block park (C2) is located at 15th Street and Eye Street, N.W. Metro construction will necessitate the taking of four pin oaks which will, however, be replaced upon completion.

James Monroe Park

Located at the intersection of Pennsylvania Avenue, Eye and 20th Streets, N.W. (C4), this park will be disrupted by cut-and-cover construction. Another portion will be used as a staging area. Trees, including black oak, red oak and sugar maple, will be taken or lost due to stockpiling of materials.

Rock Creek and Potomac Parkway (C5)

Two areas could be affected by Metro construction, both on erodible "made" soils. Thompson's Boat Center (C6) at the mouth of Rock Creek, is disrupted because of a detour and temporary bridge to its parking lot. The other is the bridge which will be disturbed to permit the sinking of a vent shaft at the northwest corner of the building. In both locations, trees will be protected; however, if not controlled, soil erosion and sedimentation would have further negative effects on Rock Creek, which is presently in degraded condition. A major grove of lowland hardwood trees will be avoided.

George Washington Memorial Parkway (C8)

Parts of this National Park Service parkway will be impacted. The maintenance yard between North Lynn Street and the Parkway at the foot of Key Bridge will be relocated due to Metro. The construction of a vent shaft will probably take small sycamores and some understory pine, spruce and ailanthus. Severe erosion at the east end of the yard could be accelerated if uncontrolled. The cut-and-cover crossing of George Washington Memorial Parkway at the airport will cause some disruption. Impact on vegetation will be minimized by landscaping with good slope stabilization. The aerial construction for the southern end of the Washington National Airport across George Washingtion Memorial Parkway should have little effect as no trees, only brush will be disturbed.

Jefferson Davis Highway to George Washington Memorial Parkway

Between Jefferson Davis Highway and U.S. Route 50 where the C Route emerges to become an on-grade alignment, there is a grassy area with patches of second growth forest and thicket with some red cedar, locust, poplar, maple, sycamore, oak, sumac, and mulberry. Scrubby growth of sumac, honeysuckle, and blackberry comprise the understory. Adjacent to Memorial Drive is a wooded area, fairly thick and not of good quality, but unique for an area of high disturbance. The wild and unlandscaped area has a thick underbrush which provides an excellent songbird habitat. A construction area and stockpiles occur primarily on the unforested sites. Some spoil has been heaped against the bases of trees; however, the mulberry and locust which are predominant will be little affected by this temporary disturbance. Although a portion of this area can be left undisturbed by Metro construction, its character will be altered. Transit train

*Third paragraph expanded

operations will negate the former pastoral quality, Replanting to replace some of the trees lost in conjunction with the remaining forest can, however, insure an excellent buffer strip along the highways to the Metro.

The wooded area occurs on deep fill. Such "made" land varies considerably in composition but is generally poorly dreained. Some erosion and sedimentation problems will occur wherever the vegetation cover is distrubed. The movement of heavy equipment and the partial cut and fill required for surface trackage in the at-grade section will accentuate this drainage problem. The low-lying areas of this segment will be prone to flooding during the construction period. The open-cut slopes which will be up to 20 feet in height will be susceptible to erosion until fully revegetated. The three small streams in the area will be subject to significant water quality problems. The removal of the existing ramp for Memorial Drive and construction of a new one will further disturb the vegetation and spoils of this area.

Iwo Jima - U.S. Marine Memorial

The C Route was aligned to avoid taking any land from the Memorial. Since Metro will be in a rock tunnel, in this vicinity, no impact is anticipated (C9).

Arlington National Cemetery

No part of the C Route passes through the cemetery. That section of C adjacent to it is on-grade on the opposite side of Jefferson Davis Highway. The relief is such that Metro opeations should be unobtrusive. In fact, improved transit facilities should alleviate the existing and ever-growing problems caused by execessive vehicular traffic to the cemetery(Cb).

Pentagon Lagoon

Runoff carrying sediment from the cuts and spoils storage piles could cause water quality and sedimentation problems in the sanctuary lagoon. The already impaired wildlife habitat could be further degraded. WMATA constols should prevent both.

C Route: Historical and Archeological Sites

Similar consideration has been taken with historic landmarks as with parkland. The C Route alignment avoided taking the 19th Street Baptist Church (Ca), a Category III landmark. Since Metro will run under Eye Street

*Fourth full paragraph deleted

adjacent to it instead of cutting through the block, the church will require only minimal underpinning

As was stated before, Arlington National Cemetery (Cb), also of historic significance is avoided altogether.

The George Washington Masonic temple (Cc) is another historic site of significance along the C Route. Located at Route 236 and Callahan Drive in Alexandria, it is landscaped with well-maintained lawn and numerous specimen trees. Since the Metro follows the existing RF&P/Southern Railway alignment, no impacts on the monument are anticipated.

Fort Lyon, a fort dating from the Civil War, is on the site of the proposed Huntington Station. However, apartment development now located on the site has already substantially disrupted the trenches. No plans exist for the fort's future development.

D Route: Parklands

Along the New Carrollton Route, the park areas include large formal squares, the Capitol Mass, landscaped traffic islands and a park.

Post Office Park

Located near the Federal Triangle Station, the park is comprised predominantly of dogwood with some holly, maple, oak and magnolia. Because it will be an entrance access site, there will be a major temporary effect on vegetation. All existing plantings have been removed, but the area will be restored with new plantings.

The Mall

The most extensive and significant impact on the National Register and Category I landmark, the Capitol Mall, is on the vegetation. Cut-and-cover construction will necessitate removal of many mature trees, but replanting on completion will restore the Mall to the extent possible to its original condition. The Capitol Mall was studied for a possible tunnel alternative, but this alternative was found to conflict with the existing tunnel under 12th Street. The present D alignment will affect the character of the Mall with the taking of mature trees, but it can, over time, be restored to its original condition (D2). Restoration and landscaping of the Mall is scheduled for completion by June 1, 1976.

Special specifications for restoration include plantings of 8" Princeton elms in sufficient quantity on an inch for inch basis, to replace a smaller number of more mature elms now slated to be taken for Metro construction.

U.S. Res. 5

A small triangle (part of U.S. Res. 5) is located between Independence and Maryland Avenues and 6th Street. This grassy triangle has been rented from NPS through WMATA for contractor staging area and will be restored by the contractor.

U.S Reservation 113

U.S. Res. 113 is located between 7th and 9th Streets, S.W., and the Railroad and C street, S.W. This park was recently restored after being used as a staging area during the construction of adjacent Federal Office buildings. All plantings are young and trees of less than three (3) inch caliper. The entire park will be required for construction staging of the L'Enfant Plaza Station and a small area along 7th Street, S.W., will be used permanently for a vent grate and an elevator for the handicapped, as well as widening 7th Street. The park will be totally destroyed, but completely restored by WMATA as soon as no longer needed for construction.

U.S. Reservation 115

U.S. Res. 115 is a small apex of a triangular block at 6th and D Streets, S.W. The surface will be used for construction staging requiring the removal of a few small trees and grass. The D Route will pass under this site by tunneling.

Folger Square

Located between 2nd and 3rd Streets on North Carolina Ave., S.E., this square has mostly catalpa, dogwood and shrub and floral landscaping (D3). Although the outbound runnel of the D Route will lie under the northern edge of this park, there will be surface distrubance since construction will be by the earth tunneling method.

Seward Square

This square, between 4th and 6th Streets and Pennsylvania Avenue and North Carolina Avenue, S.E., has an elm, several sycamores and maples which could be disturbed. Two 4" caliper trees are scheduled to be removed but will be replanted upon completion. The western two-thirds of the park is to be construction easement. As to long-term effects, the exposed vent and permanent substation should not disrupt park activities (D4).

Triangles at South Carolina and Pennsylvania Avenues

These triangles, U.S. Reservations Nos. 44, 45, 48, and 49, surround the proposed Eastern Market Station. Each is presently a grassy plot lined with large trees (12-16" caliper). As the site of the entrance to Eastern Market Station, No. 44 will require an entrance easement; Nos. 48, 49 and 45 will be used for storage and work. Some trees will be removed or damaged during construction; and the parks will be closed to users during the construction period (D5). The triangles will be fully restored to NPS requirements.

Islands in Pennsylvania Avenue

Of these islands, U.S. Reservations Nos. 44-A and 47-A are lined with shrubs and the rest (Nos. 41-A, 41-B, 50-A, 51-A, 52-A, 53-A) are grassy, lined with 2-3" caliper magnolias at about 50 per island. Several of the trees and shrubs will be taken during construction but replaced upon completion. Permanent vents will be located on Nos. 41-B, 47-A and 44-A. Although some smaller caliper trees will be removed on No. 51-A, an effort will be made to protect the 12-18" trees. A chiller plant access manhole on No. 52-A will require the removal of four 2-3" magnolias. The permanent vent and easement planned for No. 53'A will necessitate grass removal (D6).

Triangle Along Potomac Avenue

U.S. Res. 54, 255, 256, 257, 258, and 264 will be affected by the D Route with the first four being used for construction staging and the other two not being visibly affected as earth tunneling will not affect the surface. No large trees will be destroyed and few small ones.

Anacostia Park

This park, adjacent to the R.F.K. Stadium, will

*First and fifth paragraphs revised

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experience no long-term adverse impact since the area is primarily parking lot. Some small landscaped trees will be taken, but replanted upon completion. The usefulness of this area of the park for recreation is considerably reduced by the extensive parking network. However, a plan for future development of the Anacostia Park System prepared for the National Park Service by Lawrence Halprin and Associates proposes more extensive recreational uses in the area and incorporation of the Metro route into the redesign. The plan suggests such ideas as covering over existing parking with an amusement center in the Stadium area. At the Benning Road Bridge crossing, there will also be minimal long-term disruption. Although the traffic on the bridge is quite busy, the aerial Metro structure will increase visual disturbance. No long-term damage to vegetation is anticipated and no removal of native vegetation. Relandscaping will restore the area to its former conditions (D8).

Anacostia Park - Watts Branch

Since the alignment is confined to the existing railroad corridor adjacent to Kenilworth Avenue Freeway, any adverse impact has already been made to that portion of the Watts Branch section of Anacostia Park. There will be short-term disruption to the stream due to sedimentation during construction activities (D9).

D Route: Historical Sites

The Old Post Office and Clock Tower, Category II landmarks, are located to the side of Metro's alignment; no direct impact is anticipated and no underpinnings will be required (Dc). However, there is a possibility that they will be taken down for the extension of the IRS building.

Since the Metro will run in tunnel, there will be no direct impact on the Congressional Cemetery (Dd), which is a National Register and Category II landmark.

In the District, the D alignment passes close by the Smithsonian Building (1847-1855), also a National Register and Category I landmark, on Jefferson Drive between 9th and 12th Streets, S.W.; the Freer Gallery (1923), a National Register and Category II landmark; the Temporary Home for Veterans of All Wars (c1861), a Category II landmark at 9th and Pennsylvania Avenue, S.E. However, there are no direct or indirect impacts anticipated in these areas.

Two historical sites in Prince George's County, as recognized by the Maryland-National Capital Park and Planning Commission, are located in the vicinity of the D Route near the Capital Beltway. Because neither is immediately near the alignment, no impact on either is anticipated. The first is Beall's Pleasure, an elegant

Georgian brick home built in 1795 by Benjamin Stoddert, first Secretary of the Navy. The second is Widow's Neglect, built in 1852, the oldest house in its area. Traces of the foundation can still be seen near the entrance gate to New Carrollton.

D Route: Archeological Sites

Discussions with Dr. Charles McNett of the Department of Anthropology, The American University, revealed one significant site of archeological interest along the D Route. A campsite, probably once associated with the Indian town of Nacochtanke, is located near the Benning Road Bridge on the eastern side of the Anacostia River (De). A PEPCO plant, already located in the area, has disrupted the site. Metro activities in aerial structure at this point, should not affect the site because subsurface disruption will be minimal. In the event of any archeological finds, WMATA will stop work, remove and preserve such articles according to contractual agreements.

E Route: Parklands

Parklands along the E Route include formal urban squares and circles, numerous landscaped triangles, two parks and a recreation center. As stated previously, WMATA has tried to avoid the use of parkland and where such use was necessary, to minimize potential negative impacts.

Mount Vernon Square

Mount Vernon Square is located at K Street between 7th and 9th Streets, N.W., earth tunneling in 7th street should have no adverse environmental effect on the library or the urban park area. In fact, transit operations and the station will improve access to the whole Federal City College in the area.

Triangles

Numerous street triangles (U.S. Reservations 71, 176, 310B, 323F, 317B, 317, 438, 448, 369, 436, 447, 498, 526 and 323E) occur along the E Route alignment. In those cases where cut-and-cover, vent shaft, fan shaft, or station construction takes place, a major short-term impact on trees and use will take place. WMATA will restore these triangles as fully as possible to their original condition upon completion of work.

JFK Playground

Although the E Route passes by this play area in Shaw, it will not disrupt activities there (E2).

*Fourth paragraph revised

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Triangle No. 170

This triangle (E3), U.S. Reservation No. 170 is located at Vermont Avenue, 10th and U Streets, N.W. near the U Street station construction. It will, however, not experience any environmental impact from Metro activities.

Sherman Circle

The E Route passes in tunnel under Sherman Circle (E4), so no adverse impacts are foreseen for that area. Crossing Rock Creek Cemetery, the Route enters Fort Totten Park (E5) and intersects with the B Route at an area of significant woodland. This section of the park is not actively used at present. However, there will be a fair loss of mature maples and oaks during construction and potential sedimentation and erosion problems for which adequate control measures will be required. Some open space and recreation resources will be permanently lost to Metro operations.

Sligo Park

Outside the District line in Prince George's County, the alignment enters Northwest Branch and Sligo Park (E6), an active and passive recreation area at the intersection of Northwest Branch and Sligo Creek. Metro shares the proposed I-95 alignment through the park. The highway right-of-way will require considerable tree loss and channel relocation for its construction. If Metro shares this right-of-way, additional adverse environmental impacts attributable to Metro will be minimal, since Metro will not increase right-of-way requirements for I-95.

Kirkwood Recreation Center

The route passes the Kirkwood Recreation Center (E7) at Ager Road and Nicholson Street, Calvert Park between Route #1 and Kenilworth Avenue, Point Branch Park and elementary school, and playgrounds on either side of the B&O alignment in the College Park area from Paint Brush floodplain and Indian Run floodplain. Because the Metro shares the B&O Railroad right-of-way, minimal impacts attributable to Metro are foreseen for these areas.

Indian Creek Park

Indian Creek Park and Indian Creek floodplain (E8) are affected along the E Route between College Park and Greenbelt Road Stations. Although the alignment follows the railroad right-of-way, a significant number of trees will be taken for construction of the Greenbelt Road Station. This is due primarily to the station parking areas which also require the relocation of a part of the stream channel. Control measures, as

stated in WMATA contracts, will be required to prevent erosion and sedimentation of the area and the stream channel.

E Route: Historical Sites

The E Route passes very close to the National Portrait Gallery and National Collection of Fine Arts (Old Patent Office), a National Register and Category I landmark built in 1836-1867 at 7th, 9th, F and G Streets, N.W. Short-term disruptions may occur as a result of construction activities but no long-term impacts are foreseen. The station entrance at Gallery Place Station is located to one side, so no negative effects are projected.

The 700 block of 7th Street, N.W. (Ea) has been designated by the NCPC Joint Committee on Landmarks as a "special block", containing 19 Category III buildings of historical interest. The construction of Gallery Place Station will require the demolition or the partial demolition and underpinning of seven of these listed buildings on the east side of the block, along with the other unlisted properties. A total of seventeen buildings are involved. The underpinning alternative would mean removing the historic fronts, shoring, underpinning the remaining structures, and replacing the fronts 8 1/2 feet back from their original position.

The present alignment of E Route and Gallery Place Station off-center under 7th Street was established to avoid impact on the National Portrait Gallery (Category I and National Register landmark). As a result, the 90 foot wide Gallery Place Station is being placed four feet east of the centerline of the 85 foot 7th Street right-of-way. Due to this alignment, only the east side of the block would be affected. The west side of the block contains twelve Category III buildings, which will be preserved.

Alternatives other than demolition of the east side of the block or partial demolition, underpinning and reconstruction of the fronts, were precluded by the early construction schedule of the Gallery Place Station, as part of the B and E Route transfer point and the Basic System.

The alignment and preliminary design of the E Route at Gallery Place Station, preceded the designation of the nineteen building fronts on the 700 block of 7th Street as Category III landmarks.

Environmental impacts of the two alternatives considered have been identified by WMATA staff as follows.

The environmental impact of the complete demolition of the buildings would be:

- Destruction of the seven structures and their

building fronts which have been declared to be Category III landmarks;
- Probable permanent relocation of the existing small businesses on the east side of 7th Street;
- Elimination of the need to deck over the east side of 7th Street from G to H Street;
- Availability of a detour of north-bound 7th Street, to the east of the construction; and
- The availability of an off-site staging area would be provided for the construction contractors.

The environmental impacts of the alternative of partial demolition and restoration of the fronts would be:
- Reconstruction of seven building fronts designated as Category III landmarks;
- Restoration of replicas of the fronts;
- Permanent or temporary relocation of the small businesses on the east side of 7th Street;
- An impact on the operation of the small businesses during the period of construction;
- The necessity for decking over the east side of 7th Street; and
- Placing the staging area away from the construction site.

The Public Library (1899-1902), a National Register and Category II landmark located on Mount Vernon Square (Eb), is now the Federal City College Library. A new facility has already been built several blocks away to replace the public facility. No adverse environmental impacts are anticipated. Metro should provide improved access to the campus.

Deakins Hall and Cemetery (Ed), located at 16404 Queen's Chapel, include a late 18th Century home and cemetery. The property was owned by William Deakins, a Georgetown merchant. It was moved slightly to accommodate University Park subdivision. Because the Metro is in tunnel at this point, adverse environmental impacts are not anticipated.

College Park Airport (Ee), the oldest airport in continuous use in the world (established 1909) is located along the E Route. This airport was used by the Wright Brothers, as the first military training center and as the first airmail service to New York and Philadelphia as well as for early helicopter experiments. No adverse impact is foreseen on the airport itself although a new entrance road may have to be built after Metro construction activity is completed.

E Route: Archeological Sites

An area of potential archeological interest (Ec),

cited by Mr. Tyler Bastian (State Archeologist, Maryland Geological Survey) is located in the area of Sligo Run and Northwest Branch. Because Metro runs near this area, it is possible that construction might unearth something of archeological value. If such is the case, WMATA will see to the preservation and removal of such articles, in conformity with contractual agreements.

F Route: Parklands

F Route parklands include landscaped areas of federal buildings and landmarks, a playground and a park and parkway.

National Sculpture Garden

Southward along 7th Street from the beginning of the F Route to the Mall are landscaped areas of federal buildings. In the Mall area (F1), the National Sculpture Garden is now under construction. Earth tunnel construction will avoid impact to these areas.

U.S. Reservations 36 and 36A

U.S. Reservation,is a small triangular park located between Pennsylvania Avenue, Market Place and Seventh Street. Except for a statue which will be protected, the entire park willbe used as a construction staging area. U.S. Res. 36A is a circle with a statue in the center. The statue will be protected while the remainder will be used for contractor's office and shop trailers. The inbound tunnel of the F Route will pass under a small part of this reservation.

Jefferson Memorial Junior High School

This school with its two tennis courts and one basketball court is located between 7th and 9th (closed) and H and Eye Streets (closed), S.W. During construction of a substation in Eye Street (closed) and underpinning of the school library, disruption of the surface will be considerable, but of a temporary nature. Two tennis courts will be destroyed and temporary courts constructed in the Jefferson Recreation Center Playground. One outdoor basketball court will be destroyed and a temporary court constructed in the grounds on the west side of the school. There will be no lasting adverse affects as the school ground areas will be restored including the three playing courts. The temporary courts may remain in place if the School Board so desires. THe two F Route Tunnels passing under the school yard will be earth-tunneled and should have no appreciable affect on the surface.

Anacostia Park

Some disruption to grassy areas near the river will be necessary while constructing tunnels by the cut and cover method and a fan shaft grater. There should be no lasting adverse environmental effects in this area.

*Fourth paragraph revised and expanded

Avalon Playground

Avalon Playground is located on the south side of Good Hope Road and north of Fort Stanton Park. Earth tunneling construction will be used, thus having no impact on the surface of the ground.

Suitland Parkway

At the District/Prince George's County line, the F Route crosses the wooded parkland through which Suitland Parkway (F5) passes. The three crossings are necessitated by station locations. But, for the most part, the alignment follows the fringe between residential and park land to minimize impact on each. The aerial structure proposed at the first crossing will create a visual intrusion into the natural wooded landscape. Construction of the aerial structure will cause loss of woodland and short-term disruption of the Parkway. Cost factors and terrain influenced the choice of an aerial structure at this point. The F Route crosses under the Suitland Parkway again further east via cut-and-cover structure. Metro continues east on the ridge line north of the Parkway, causing the loss of mature trees due to construction and the filling of local valleys which will visually and ecologically diminish the Parkway experience. Control measures contained in WMATA contract provisions will be required to prevent erosion/siltation problems on the steep slopes now covered by forest.

Beyond the station at the federal complex, the route

again parallels and then crosses under the Parkway. Again in this segment, loss of large trees and topographic changes will create a visual and ecological loss. Along the Parkway, high water tables will cause construction problems. Crossing the park on fill, the alignment traverses a significant area of healthy, relatively undisturbed floodplain forest.

Naval Oceanographic Command Complex

The station location at Silver Hill Road on the surplus portion of the Naval Oceanographic Command Complex (F6) will involve loss of woodland on the northwest third of the site.

F Route: Historical Sites

Several important landmarks of national significance occur along the F Route. Although Metro will pass close by, no major disruption of either short or long-term is anticipated. The National Bank of Washington (1889), a Category III landmark at 301 7th Street, N.W. and the National Gallery of Art (1941), a Category II landmark at 6th Street and Constitution Avenue, N.W., are avoided by the alignment. An entrance to the Archives Station has been planned in the area of the eastern end of Federal Triangle (1924-1934), an area designated as Category II, at 7th Street and Market Space and a possible future entrance at National Archives (1935), a National Register and Category II landmark at Constitution Avenue between 7th and 9th Streets, N.W. In each case, the entrance site has been planned to provide easy access, but to minimize any disruptive effect on the area.

In the station area near Wheat Row (Fa), a Category II landmark, there are four historic houses (ca. 1794) at 1313-21 4th Street, S.W. Some short-term disruption may occur here due to cut-and-cover construction, but it should not endanger the structures.

Earth tunnel construction under the Washington Navy Yard will minimize potential negative impacts on the historic area. Construction of the Navy Yard Station may cause short-term disruption. As specified in WMATA contractual agreements, adequate protection should be provided in those areas of historic significance.

F Route: Archeological Sites

Two archeological sites (Fb) along the F Route adjacent to the Anacostia River were cited by Dr. Charles McNett (The American University, Department of Anthropology). The first is in the immediate area of

of the 11th Street or Anacostia Bridge on the District side of the River and the other is in Anacostia Park on the eastern side of the river. These are areas of campsites of mixed ages probably associated with the Indian town of Nacochtanke. Neither of these sites is likely to be affected by Metro activities since earth tunnel construction will probably be deeper than the sites. In the event that some significant archeological finds are unearthed, WMATA will provide for their removal and preservation according to its contractual agreements.

G Route: Parklands

The G Route involves one sizeable parkland, Fort Mahon Park (G1). Located at Benning Road and Minnesota Avenue, it is a park of tree-covered hills. The subway, here in earth tunnel, will impact very minimally the park above. A recreation field in this area will experience a minor short-term impact.

G Route: Historical and Archeological Sites

Fort Mahan Park, a Category II landmark, is the only historical site in the immediate vicinity of the G Route. There will be no disturbance on the surface due to the underground tunneling. However, should any finds be made, their preservation and removal will be provided for under contractual agreements in that regard.

H Route: Parkland, Historical and Archeological Sites

The H Route is located entirely within the Richmond, Fredericksburg and Potomac Railroad right-of-way. No parkland, historical or archeological sites have been located along this area.

J Route: Parklands

Three park areas occur along the proposed J Route: Backlick Stream Valley Park, Trailside Park and a pending parkland (70)acres) recently acquired by Fairfax County for a community recreation area. All three parks are in the area of the junction of I-95 and I-495.

Backlick Stream Valley Park
Backlick Stream Valley Park (J1), is located along

* Third paragraph revised

the wooded floodplain of Backlick Run between I-495 and Southern Railway near I-95. The Metro alignment is to be located along the stream channel and therefore, the channel will require relocation and filling. Although a significant environmental impact is foreseen, several factors contributed to the choice of this alignment in the Backlick Park area. These include future railroad expansion plans, cost factors and attempts to minimize interference with I-95 roadway and ramps.

Trailside Park

To the south of the I-95/495 junction is a park (J2) adjacent to at-grade construction. Impact upon this area due to Metro construction and operations will be negligible.

Proposed Park Area

Located in the vicinity of I-495 and the RF&P Railroad, this park (J3) has not yet had specific plans made for the 70 acres acquired from the Virginia Department of Highways. In general, a community active play area is envisioned. At-grade construction in the immediate area will influence future development of the park.

J Route: Historical and Archeological Sites

No historical or archeological sites are documented along the J Route. However, if any finds are made, their preservation and removal will be provided for under WMATA contractual agreements.

K Route: Parklands

Parklands along Virginia's K Route range from playgrounds to school recreation areas to developed park areas. All occur along constructed I-66 west of the Beltway and the proposed I-66/266 alignments from the Beltway to Rosslyn Station of the C Route. Impacts along the entire route are anticipated to be minimized by the use of this shared right-of-way.

Quincy Playfield

This playfield (K1), forming a large portion of the grounds of the County Central Library, consists of a large open active play area and several tennis courts. Numerous mature trees are located on the grounds. The majority of this area will be approximately three hundred feet north of the proposed Metro alignment on Fairfax Drive. The playfield will be only minimally affected during construction operations. There are no long-term impacts foreseen.

Laceywood Park and Playground

This 11.3 acre facility (K2), located at Washington Boulevard and George Mason Drive, is sufficiently far away from the K Route alignment so that the impact of Metro construction and operation will be negligible.

Westover Playground

This play area (K3), located south of the proposed I-66/K Route alignment may experience negative environmental impacts of the at-grade construction of transportation facilities adjacent to it. During construction, there will be a short-term disruption at the edge of the playground and increased noise levels. At-grade operations will cause long-term increased noise levels. I-66 and Metro have made plans for connecting this playground with Bon Aire Park by a bike path and hiking trails. The pathway system would make these parks readily accessible from adjacent residential areas.

Bon Aire Park

This well-used linear park (K4) off Four Mile and Fairfax Drive is in the path of the I-66/Metro alignment which follows Four Mile Run Stream. At-grade construction will impact this area. The stream will have to be channelized to accommodate I-66.

Madison Manor Park

A small park (K5) east of the proposed East Falls Church Station, it will be the site of the station. Part of this land will be taken for the station, but not the entire park.

Stuart Arts Center

This former school with a recreation area to its rear (K6) is located at the intersection of North Underwood Street and North 29th Street. The Center is sufficiently far northeast of the K Route alignment so that impacts will be negligible.

Mount Daniels School

The school property, which includes a ballfield (K7), is located at Oak, Haycock and Great Falls Roads. The property is sufficiently close to the Metro right-of-way so that there will be short-term impacts during the performance of construction activities. Heavy screening of the school from the right-of-way should be planned. Short-term impacts include increased noise levels and some disruption of access roads to the school.

George Mason High School

Located at Leesburg Pike and Haycock Street, the school property (K8) includes a road and stadium, both

of which are designated as parkland. This road, which provides access to the Stadium, is traversed by K Route in at-grade construction. Metro in accordance with contractual agreements will provide for an alternative access route to the stadium.

Fairfax County Elementary School Site

This site (K9), located between I-495 and Virginia Avenue, is sufficiently far away from the Metro alignment so that impacts are negligible.

Fairfax County Elementary School

This school (K10) is located northwest of the overpass of Gallows Road and I-66. With the Metro alignment and station facilities located in the median of I-66, the impact upon the school and its grounds will be negligible.

George C. Yeonas Park

Located on the northeast corner of the junction of Cedar Lane and the proposed I-66/K Route alignment, this ballfield (K11) is under a lease agreement to the Little League of Vienna. At-grade construction will cause some disruption at the edge of the park. A substation will also be located in this park.

K Route: Historical and Archeological Sites

There are four historical sites along the K Route in Virginia. The District of Columbia original cornerstone marking the District/Virginia boundary is in a small park at the present Falls Church/Arlington County border. Hollywood Farms is located just south of the intersection of Routes I-66 and 7. Highland View, also known as the Flag House is right across from Hollywood Farms. Finally, the Mount is located between I-66 and Idlewood Road, one-quarter mile south of Route 7.

The District of Columbia original cornerstone (Ka) is a market in a small park located at 814 West Street at the Falls Church - Fairfax County boundary line. It is well south of the K Route right-of-way so that impacts will be negligible.

Hollywood Farms (Kb) is an historic building, located at 7217 Leesburg Pike. Metro construction and operation will not cause any impact upon the building or property.

Highland View (Kc), also known as the Flag House, is located on Gordons Road west of Hollywood Farms, but sufficiently west of the Metro right-of-way so that impact will be negligible.

The Mount, an historic building (Kd), located on the east side of Idlewood Road between Barbour Road

and Dunford Drive, is sufficiently west of the Metro right-of-way to avoid any impacts.

No archeological sites of significance are documented along the proposed K Route in Virginia. However, in accordance with WMATA contractual agreements, any finds of this nature will be preserved and removed.

L Route: Parklands

The park, wildlife or recreation areas involved along the L Route are the Jefferson Recreation Center, Park No. 2 in the Southwest Washington Redevelopment Area, the Yacht Club morrings in the Washington Channel, East Potomac Park, the right-of-way of George Washington Memorial Parkway, the Roaches Run Waterfowl Sanctuary and the Pentagon Lagoon. The construction of the route will temporarily disrupt the use, either wholly or partially, of the Jefferson Recreation Center, Park No. 2 and the Yacht Club moorings, but each of these disturbed areas will be completely restored to its original condition when construction is complete. In addition to these temporary disruptions, Metro will take a small amount of parkland in East Potomac Park and pre-empt a small amount of land in that part of the right-of-way of the George Washington Memorial Parkway lying between the river the the Parkway.

Jefferson Recreation Center

The Jefferson Recreation Center is located between 7th and 9th (closed) Streets and G and H (closed) Streets, S.W. The surface of this playing field area will be disturbed only while constructing two (2) tennis courts to replace those that will be demosished on the Jefferson Memorial Junior High School grounds by F Route construction. There will be two (2) tunnels of the L Route and two (2) tunnels of the F Route passing under this area with no effect on the surface.

Park No. 2, Southwest Redevelopment Area

This small urban waterfront park (L2), lying between Hogate's Restaurant and the Flagship Restaurant, is directly in the path of the alignment. The park will be completely disrupted because construction will be cut-and-cover. The park, though, contains only recent plantings, none of which is unique and restoration will be complete. The Redevelopment Land Agency was aware of Metro plans while constructing the park.

Yacht Club Slips

About 70 slips (L3) in the Washington Channel next to Park No. 2 will be lost during construction. All will be replaced upon completion of this portion of the L Route, but prior to demolition, a new facility will be constructed downstream for use of the Capitol Yacht Club. This new facility will be sold to a waterfront developer after the Yacht Club facilities bave been rebuilt.

*Third, fifth, sixth para. revised

East Potomac Park

There will be a disruption of three tennis courts due to cut-and-cover construction. These will be relocated permanently prior to Metro construction. About 0.6 acres

will be taken for the eastern tunnel portal and another 0.3 acres will be pre-empted under aerial structures(L4). Substitute facilities are to be provided. Large construction easements will be required on both sides of the tunnel right-of-way as the tunnels will be constructed by the cut-and-cover method. A large construction area will also be required around the portal.

George Washington Memorial Parkway

The George Washington Memorial Parkway will be crossed from bank of the Potomac River to the west side of the Parkway by an aerial structure. Shortly before leaving the Parkway, the aerial structure reaches ground level. Considerable disruption of the surface will occur during construction and some minor impedance to traffic might take place. After restoration, there will be no appreciable esthetic damage to the Parkway.

Pentagon Lagoon

A band of approximately 500 feet by 40 feet on the south shore of the lagoon will be disrupted, but restored.(L7).

Roaches Run Waterfowl Sanctuary

Because the proposed alignment avoids the sanctuary entirely, there will be no short or long-term impacts (L6).

With regard to the L Route, only a sunken tube, or earth tunnel, or no crossing alternative of the Potomac would assure the taking of no park or recreation land. Since the cost of either of the tunnel schemes was considered to be excessive and a second crossing to be essential to an acceptable level of service, there seems no "feasible or prudent alternative" to the long-term use of small amounts of parkland. The alignment has been designed to avoid Roaches Run Waterfowl Sanctuary and to cause only short-term disruption to parkland and activities which will be fully restored to their former conditions after construction is completed. Minimal amounts of land are required for bridg3 approaches.

L Route: Historical and Archeological Sites

Along the L Route, the only historic site is East Potomac Park, which is listed in the National Register of Historic Places. There are no buildings of historical significance.

*First paragraph expanded and last paragraph revised

SECTION 3: ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

More so than any of the other impacts, the short-term disruptions caused by Metro construction are perhaps the most unavoidable. They are also the most widespread geographically. Any project as extensive as the Metro regional system will have a major impact while construction is underway. WMATA contract regulations governing cleanliness, debris and safety will be applied to ensure adequate protection of the public, both vehicular and pedestrian Contracts also stipulate that traffic be kept moving at all times and that pedestrian and vehicular access to buildings adjacent to Metro construction be kept open. Even with these regulations, however, there will be short-term impacts such as traffic congestion, noise and dust. There may also be secondary effects such as temporary loss of trade and damage to property. Although unavoidable, these impacts are not threatening to life and do not result in long-term disbenefits.

Displacement of families and businesses is viewed as a short-term unavoidable impact. While often this is a major problem in large-scale capital improvement projects, Metro displacement has been minimized wherever possible. Approximately 722 businesses and 951 households will be required to relocate for Metro. Relocation payments and assistance are judged adequate.

Loss of mature trees and vegetation along streets and in some parklands is another unavoidable adverse environmental effect. The portion of the Mall crossed by the D Route will experience a significant loss of mature trees. In addition, vegetation and trees will be removed in parts of several urban parks including Lafayette Square, Farragut Square, Union Station Plaza, James Monroe Park and Sherman Circle. Street trees and highway landscaping will also be affected. While WMATA will replace all vegetation removed, it cannot compensate for the mature specimens lost. This is an unavoidable impact which will be overcome gradually as replacement vegetation matures.

The taking of parklands, historic buildings and archeological sites is also considered adverse. Metro alignments have been located to minimize such taking wherever possible. Some routes, however, require use of limited amounts of parklands; others will temporarily disrupt parks, although not take them permanently. A discussion of Metro's impact on parklands, historic buildings and archeological sites is included in a separate section of this appraisal.

*Relocation figures in second paragraph updated to June, 1975

During construction of the Metro system, short-term disruption of some local services can be expected, including disruption of local traffic movements and street systems, sewers and drainage systems, water mains, landscaping, and street and traffic lighting systems. Under the terms of the master agreements between WMATA and each jurisdiction, each jurisdiction must review the system construction schedule and approve WMATA's plans for replacement and modification necessary for any facilities damaged, and for maintenance of orderly traffic movements. A copy of the Master Agreement between WMATA and Arlington County, Virginia is presented in Appendix B of Part 3 of this study.

Sedimentation and hydrologic effects may result in some unavoidable adverse impacts. In general, there are potential problems particularly as related to spoils disposal, extensive grading on slopes and construction in floodplains. Examples of areas where these problems may occur include: the A Route alignment through Rock Creek Park, the E Route Greenbelt Station and Yard, the Landover And Cheverly Stations on the D Route, the Springfield Station on the J Route and the shared rights-of-way with I-66 along Four Mile Run and the K Route and with I-95 through the floodplains of Sligo Creek and Northwest Branch on the E Route. With the application of special control measures in these areas and with enforcement of state and local regulations and WMATA contract agreements in all Metro construction areas, it is not likely that problems of major significance will result. It should be recognized , however, that construction in predominantly open floodplains permanently alters the natural floodplain environment. Furthermore, even with the most stringent regulations enforced, there are likely to be minor infractions and accidents which are adverse and unavoidable.

*New first paragraph

REVISED

SECTION 4: ALTERNATIVES TO THE PROPOSED ACTION

The study and planning of alternative systems for transportation in the National Capital Region predates the establishment of the Washington Metropolitan Area Transit Authority by nearly fifteen years. This process prior to the formation WMATA in 1967 involved the attention and action of four presidents, the U.S. Congress, the governments of the District of Columbia, two states and their suburban Washington counties and municipalities, and virtually every public agency concerned with transportation and development in these jurisdictions.

The basic 25-mile transit system had already been authorized by the National Capital Transportation Act of 1965, when WMATA became the authority for the system. The alternativesfor the system considered prior to the formation of WMATA are discussed here in less detail than those for which WMATA has been responsible, since it is WMATA's"proposed action" to which this study is addressed. Relying on the conclusions and experience gained from previous studies of alternatives, it was not necessary for WMATA staff and consultants to restudy alternatives previously rejected by Congress. However, the brief description of these prior alternatives will illuminate many of their related impacts, which were factors in the evolution of the present system.

The alternatives described are grouped into four major categories: Pre-WMATA system alternatives, no-action alternatives, system alternatives studied by WMATA prior to the 1968 Adopted Regional System, and the Post-ARS '68 and current planning as part of the engineering design of the Adopted System. The description of alternatives is prefaced with a discussion of objectives and constraints influencing the present system.

CONSIDERATIONS IN ARRIVING AT THE PRESENT SYSTEM

Several key objectives and constraints have guided the evolution of the regional transit system throughout the more than twenty years of planning. The alternatives which are described in the following section should be understood in terms of these objectives and constraints. Briefly summarized, increased accessibility, reduced reliance on the private automobile and minimal environmental disruption have been foremost objectives.

The regional rapid transit plans that have been developed over the years have been designed to facilitate access from high-growth residential suburbs to downtown Washington and to increase inner-city residents' access to suburban employment centers, while at the same time reducing traffic congestion and the need for auto-related facilities. Routes have been located with the dual purpose of minimizing disruption - social, economic and environmental - while maximizing patronage. One of the key prerequisites to approving and funding a regional rapid rail system has been that it take the least objectionable course through the region.

SYSTEM ALTERNATIVES STUDIED PRIOR TO WMATA

As early as 1950 the National Capital Planning Commission (NCPC) called attention to the transportation problems confronting the city due to great concentrations of federal employment within the central business district and an expected increase (30% in 30 years) in vehicular movement, in their report "Moving People and Goods".

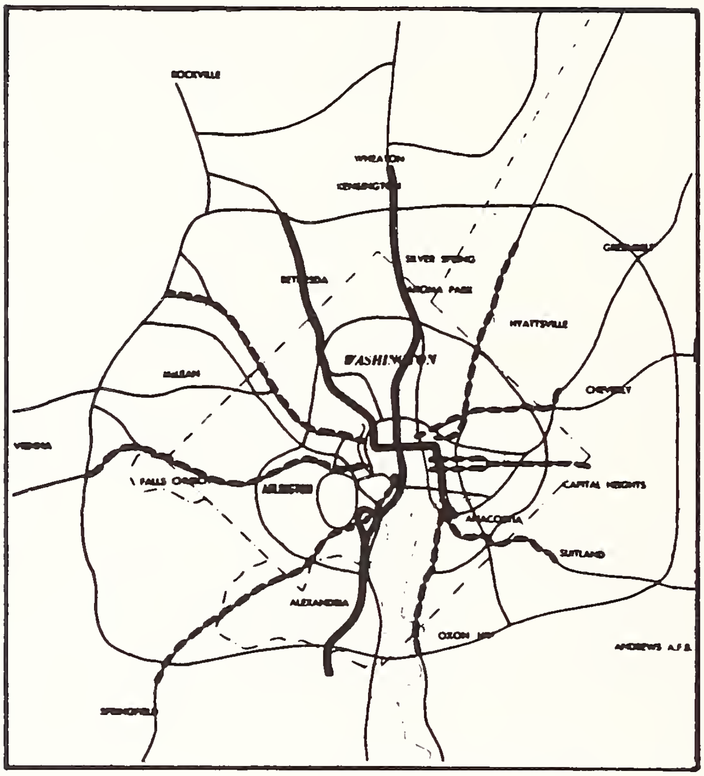
The National Capital Planning Act of 1952, which requires NCPC and NCRPC (The National Capital Regional Planning Council) to prepare comprehensive plans for the movement of people and goods in the region, was followed by the Second Supplemental Appropriations Act of 1955, which provided funds for these agencies to "jointly conduct a survey of the present and future mass transportation needs of the National Capital Region". A joint Steering Committee was appointed and the study became known as the Mass Transportation Survey. The final recommendations of this study were considered by many to favor auto-oriented improvements to the transportation system over rapid transit.

The Mass Transportation Survey of 1959

Among the various consultant reports for the Joint Committee, as well as others dealing with economic base, traffic engineering and organization, was a report produced by De Leuw Cather and Company on civil engineering which evaluated the costs and revenues of alternative transportation systems. These alternatives included: an Auto-Dominant Plan, an All Express Bus Rapid Transit Plan with Recommended Freeways, an All Rail Transit Plan with Recommended Freeways, and the Recommended Rapid Transit Plan with Recommended Freeways, which was the plan recommended by the Mass Transportation Survey report of 1959, entitled "Transportation Plan, National Capital Region".

TRANSPORTATION PLAN
NATIONAL CAPITAL REGION

1959 RECOMMENDED PLAN



Freeways and parkways

Rail rapid transit

Buses on freeways

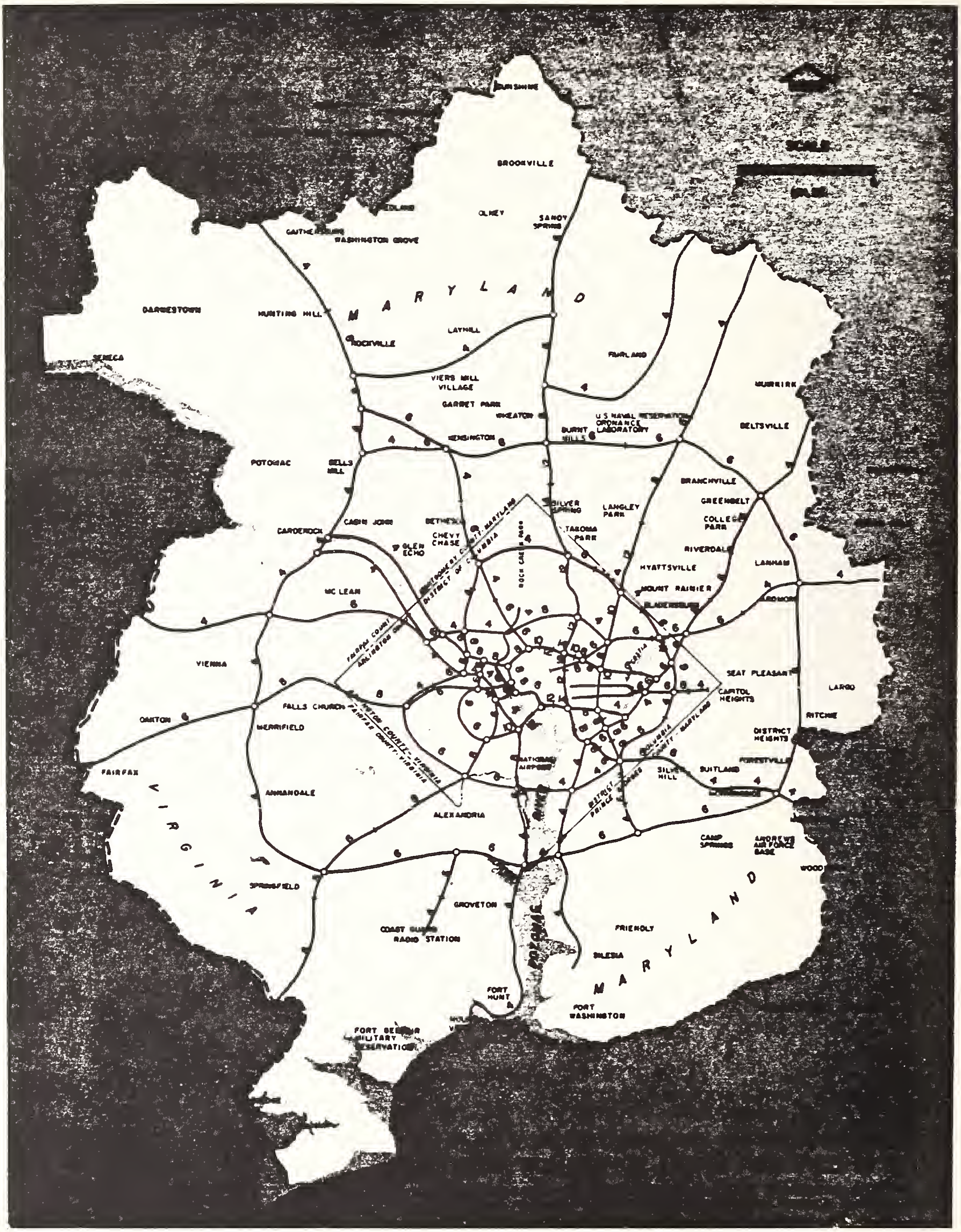
Source: NCTA, Rec. for Transportation in the National Capital Region, November 1962

Map 7

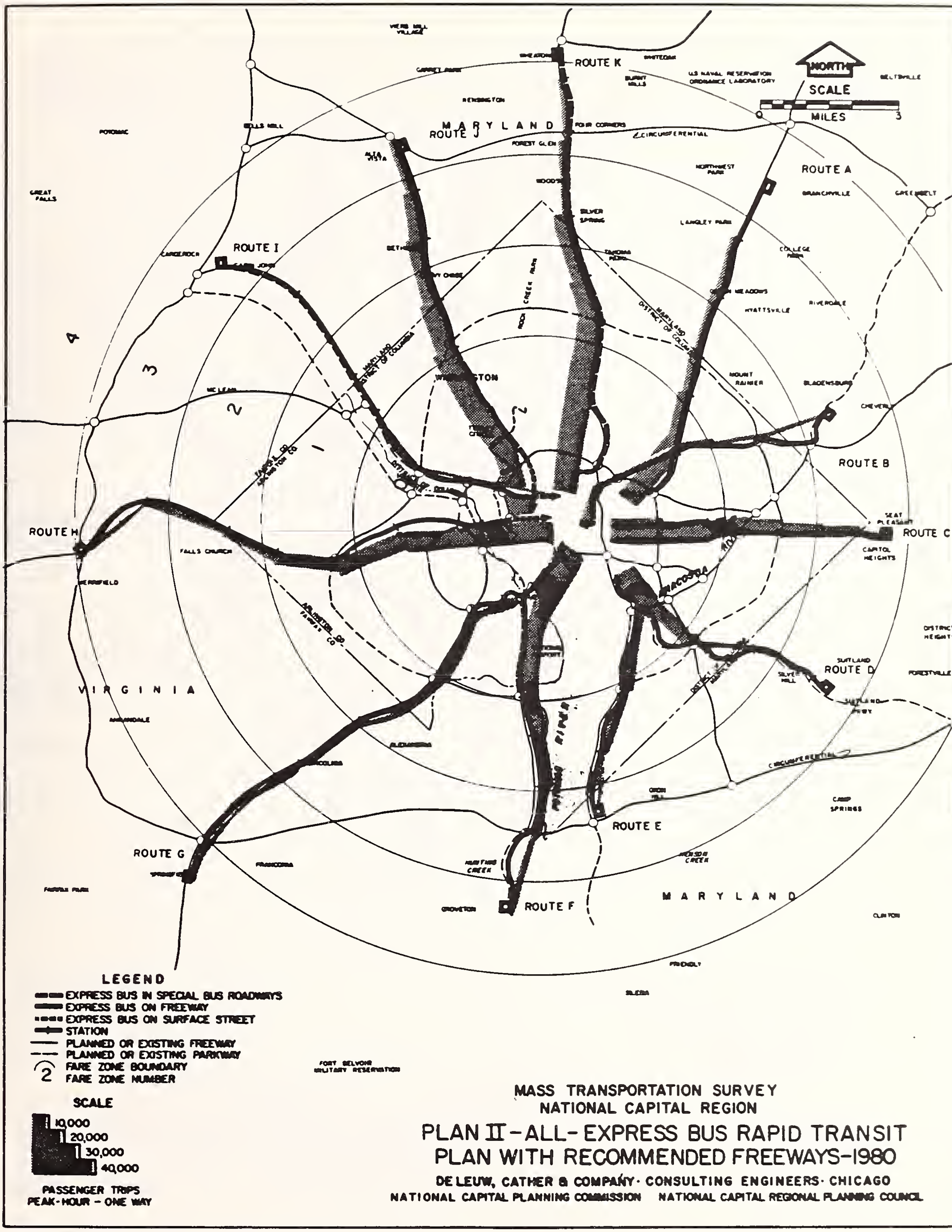
The Auto-Dominant Plan consisted of a network of 344 miles of freeways and parkways in 15 radial routes interconnected by a series of concentric beltways. The consultants estimated that this system would have resulted in a one-third increase, between 1955 and 1980, in the number of autos entering and stopping in the central businesss and government district during the rush hours. It would have required 85,000 new off-street parking spaces. The traffic going to and from the central business district would overload the streets serving the freeway ramps, and the system would need 12 to 18 lanes on some of the major sections, making the maneuvering and other operational characteristics impractical, if not dangerous. The Auto-Dominant Plan could be considered as one of the no-action alternatives to Metro.

The All-Bus Rapid Transit Plan with the recommended System of Highways consisted of a system of high speed express buses making few stops and traveling on freeways, parkways, or grade-separated bus lanes with an enlarged highway network (the recommended system). This plan was considered infeasible because of the lack of suitable rights-of-way, especially on the north and northwest corridors, the numbers of buses needed which would eventually slow movement, the conflict with auto and pedestrian traffic, the impractical design of stations and special facilities that would be required, and high costs. The All-Bus Rapid Transit Plan could be considered as another of the no-action alternatives to a regional rapid rail system.

The All-Rail Rapid Transit Plan with Recommended Freeways consisted of nine rail routes converging on the central area, where they were combined to form a cross composed of one two-track, north-south route and one four-track east-west trunk route intersecting at 12th and E Streets, N.W. It was based upon the completion of highway projects then under construction, the same as the All-Bus Rapid Transit Alternative. This alternative was discarded in the report prior to the description of its features. Typical comments were: "Washington's geography as well as its low density pattern of...building developments discourage widespread use of rail rapid transit" and "the high initial cost of such facilities...requires concentrations of travel not found in Washington except in a few instances...in the central area, a similar lack of concentration prevails". Specific reasons were not documented for this alternative's rejection.

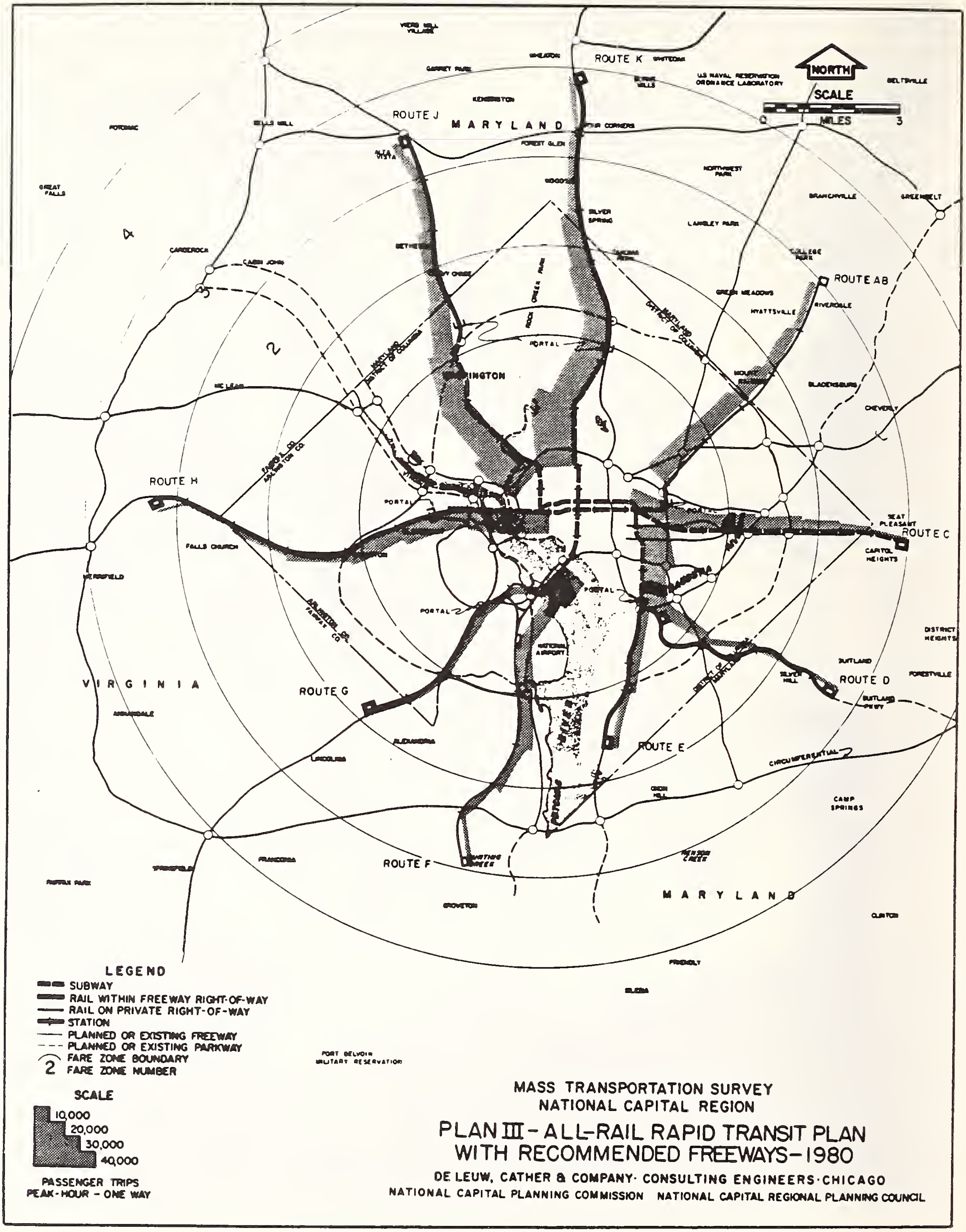


1959 AUTO DOMINANT PLAN

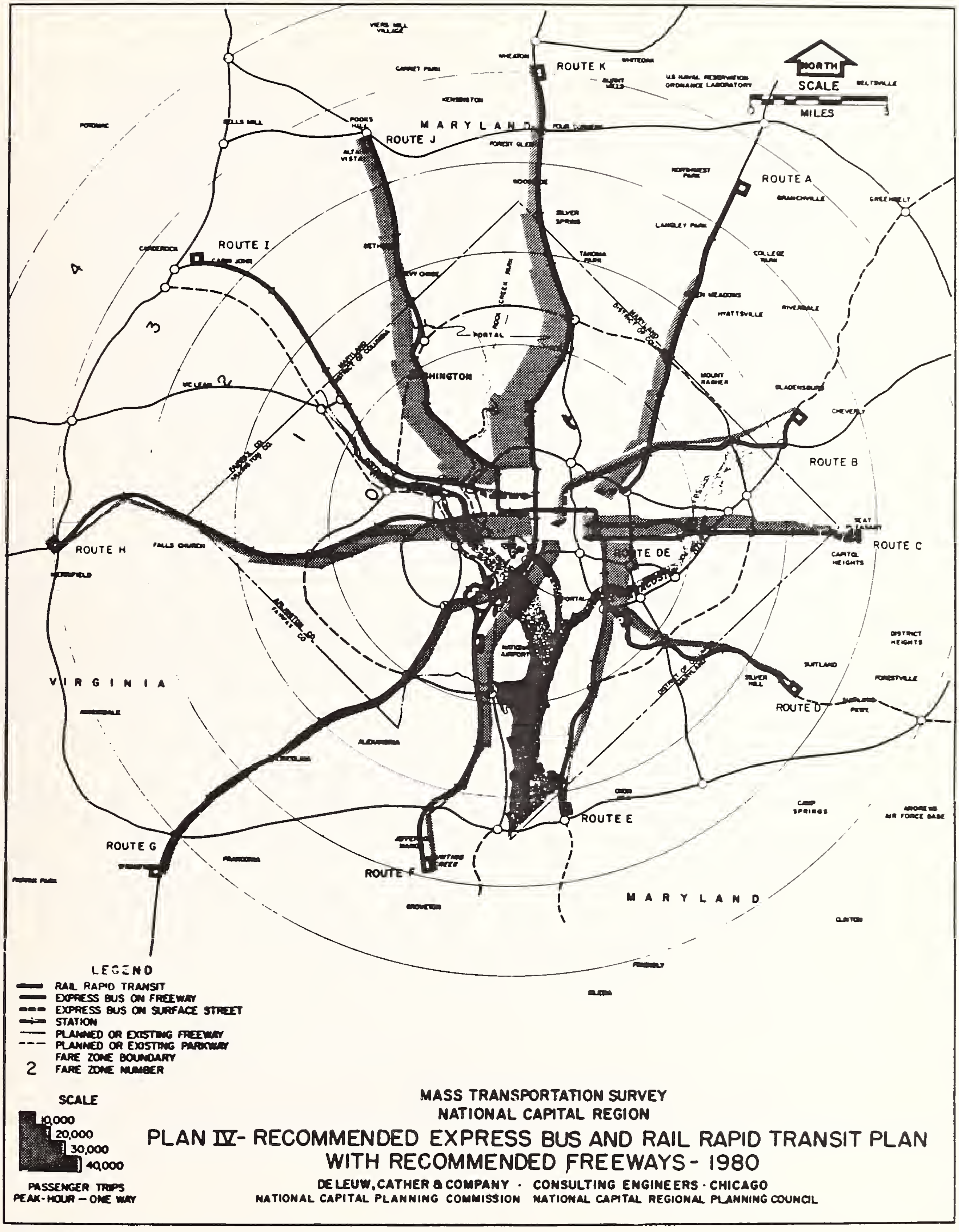


1959 ALL-BUS RAPID TRANSIT PLAN

Map 9



1959 ALL-RAIL RAPID TRANSIT PLAN



1959 RECOMMENDED HIGHWAY TRANSIT PLAN

The conclusion of the discussion of this alternative stated:"Washington is a young and vigorously growing capital city. While it is old in terms of the history of America, it was incorporated only 156 years ago, whereas Berlin is over 700 years old, London is about 1900, and Paris over 2000. The All-Rail Plan as studied in 1958 is not appropriate for Washington as visualized in 1980, but such a system may be needed for the city as it will be few decades later."

The Recommended Highway-Transit Plan was a consolidation of the best features of the previous alternatives, and included an expanded network of freeways together with an extensive system of rail rapid transit for the north, northwest, south and Anacostia corridors, and express bus facilities in six other corridors plus service to the Anacostia rail terminus from Suitland and Oxon Hill.

Response to this alternative in the public hearings and the press was critical of the extensive highway system and the impact it would have upon the District. The rail portion of the plan, however, received considerable support, which subsequently influenced the support given to rail transit in Congress. The 1959 Recommended Plan received its greatest challenge from the NCTA Report of 1962, discussed next. The major criticisms were on high operating costs, loss of tax revenue due to taxable land taken for transportation, displacement of 33,000 people, unsatisfactory service to Prince George's, Fairfax and Arlington Counties and high capital costs.

Response from public hearings by the Joint Committee on the Mass Transportation Survey resulted not in the adoption of the Mass Transportation Plan, but in the drafting and enactment of the National Capital Transportation Act of 1960, creating the National Capital Transportation Agency (NCTA). It directed this new federal agency to consider alternatives to the 1959 plan; to consider the early development of a downtown subway, express transit lines, and expanded use of existing rail facilities; to prepare a comprehensive Transit Development Program; and, subject to Congressional approval, to construct and provide for operation of public transit facilities.

NCTA Recommended Transportation System of 1962

NCTA's Report to the President of November 1, 1962, associated the transportation problems of the region with the rapidly expanding population (especially in the suburbs).

which had no alternative to the automobile for getting to their jobs, which were concentrated downtown.

Two general solutions to these problems, more and more highways, or a balanced system of highway and mass transit facilities, found their expression in five basic alternatives studied by NCTA: an All Highway System with No Additional Transit, an All Highway System with Improved Bus Service, a Minimum Highway Program with Rapid Transit (the program recommended in the 1959 Plan), and their Recommended Transportation System. It was sent to Congress with strong presidential endorsement on May 27, 1963.

The first of these alternatives, the "All-Highway System with No Additional Transit", was a reevaluation of the 1959 All-Highway Plan. It was rejected in 1959 due to the impossible peak hour traffic loads on many of the radials downtown and because it could not serve the rapidly growing metropolitan area. NCTA confirmed these findings and added that an all highway system would result in intolerable congestion in virtually every corridor of the region as well as downtown.

The "All Highway Solution with Better Bus Facilities", based on the same highway network of the 1959 Plan, was an attempt to make this plan work by considering a large-scale program of : (a) special lanes for buses in the median strips, (b) suburban park and ride facilities, and (c) use of the police power and facilities designed to favor bus movement. The failure of similar attempts elsewhere, the harmful effects on business, its high cost, and the "stop-gap" nature of the solution, were all cited as reasons for NCTA rejecting this alternative. Aspects of this plan have been incorporated in current transportation planning for the region, complementing the rapid rail system.

The "Minimum Highway with Rapid Transit" alternative assumed the completion of these highway projects then under construction (several of which are now in question due to court action on environmental grounds), and the same rapid transit system as in their Recommended Transportation System. After pointing out the advantages of lower cost and of a sizeable system with minimum future highway construction, they rejected this alternative because certain peak hour movement corridors would not be susceptible to diversion to rapid transit thus causing substantial congestion.

The NCTA evaluation of the 1959 Mass Transportation Survey Plan was described previously.

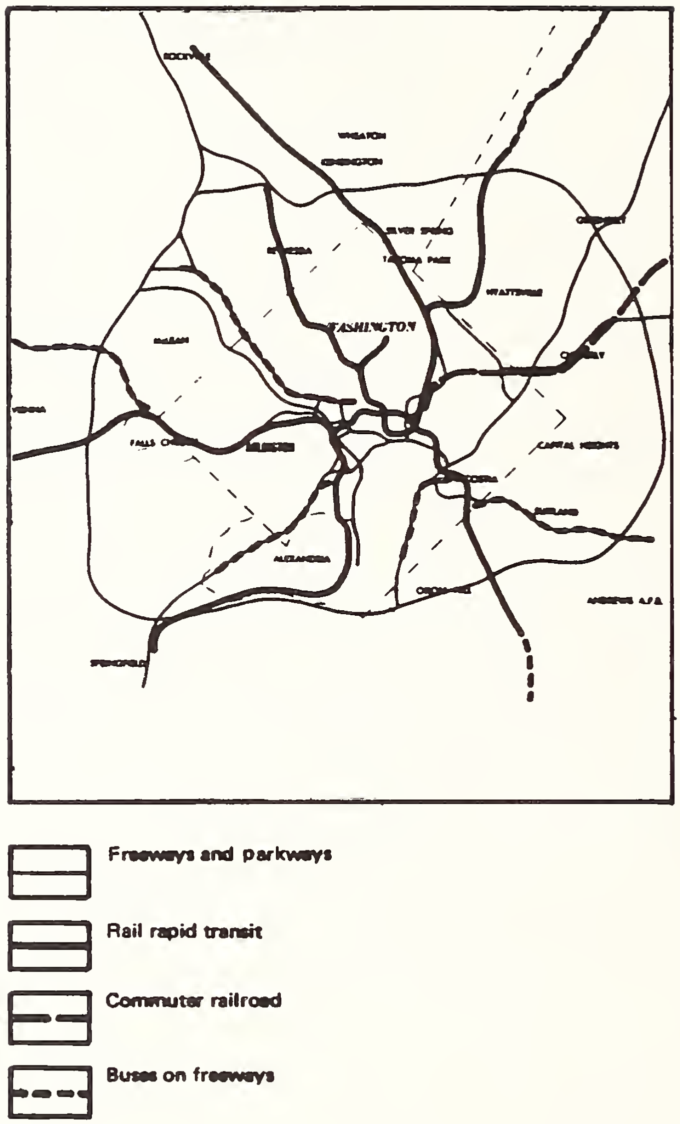
NCTA's Recommended Transportation System included two major features: an express transit system, and a moderate increase in the highway network.

*Third paragraph expanded

REVISED

NCTA 1962 MINIMUM HIGHWAY WITH RAPID TRANSIT

NCTA TOTAL TRANSPORTATION SYSTEM



Source: NCTA, Rec. for Transportation in the National Capital Region, November 1962

Map 12

The recommended express transit system consisted of two subway routes crossing twice with downtown, seven rapid rail transit routes and one commuter railroad route extending the downtown system to the suburbs, parking areas in connection with suburban stations, and express and local bus services with connections to high speed trains. The heart of the system was the 83 mile rail rapid transit with 65 stations. NCTA's recommended highway system was a 50 mile increase in the assumed system, which included 140 miles of existing and 65 miles of committed freeways and express parkways.

This plan, which received strong endorsement from President Kennedy, was supported widely. Criticism came primarily from special interests such as the bus companies, including D.C. Transit, and highway user groups. Congress, however, had reservations on the self-supporting potential of an 83 mile system.

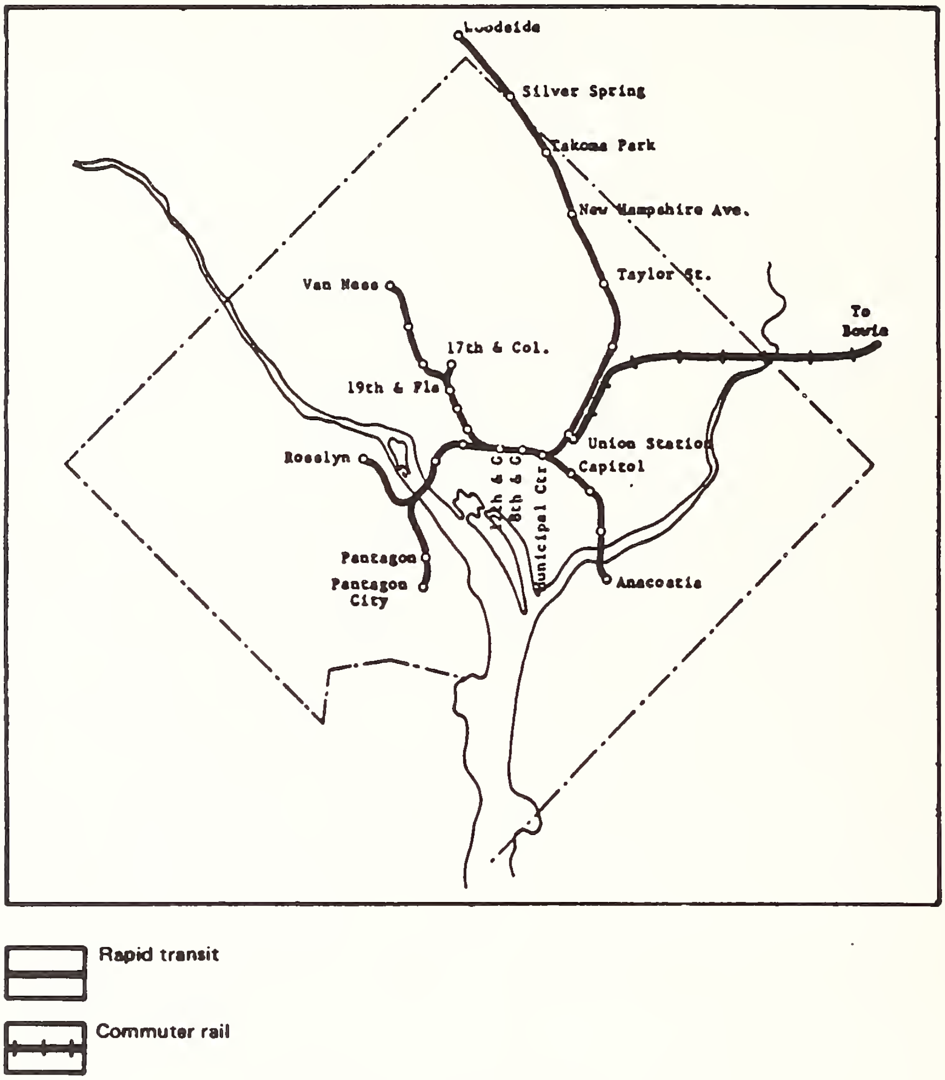
The Whitener Plan

In a supplement to the hearings on the NCTA Plan, Representative Basil Whitener (Democrat, North Carolina) introduced a bill (H.R. 8929) authorizing the construction of a 23.3 mile subway rail rapid transit system, essentially an abbreviated version of the NCTA Plan but largely within the confines of the District of Columbia. It would extend to Woodside, the Pentagon and Rosslyn, with a commuter rail line to Bowie. This bill was intended to overcome the reservations of suburban jurisdictions about the location of suburban lines, and the uncertainties of changing land use and development patterns before 1980, in order to proceed with the construction of the basic portions of the system. Opposition on issues of public ownership, lack of labor protection, expense and competition with bus companies defeated the plan in 1963.

The Authorized Rapid Transit System of 1965

A 25 mile Basic Plan for a rail rapid transit system which insured a more self-sufficient revenue operation by serving more built-up areas, and served the Pentagon, Pentagon City and Rosslyn in one Arlington County line, was introduced to Congress in 1965.

23.3 MILE WHITENER PLAN – 1963



Source: U.S. Congress, H.R. 8929, "System Authorized by Substitute Bill"

Map 13

This new plan attempted to overcome many of the obstacles of the Whitener Plan by providing for private operation and financing organizational changes. This plan passed both houses of Congress by the end of August 1965, and received authorization for the program in October.

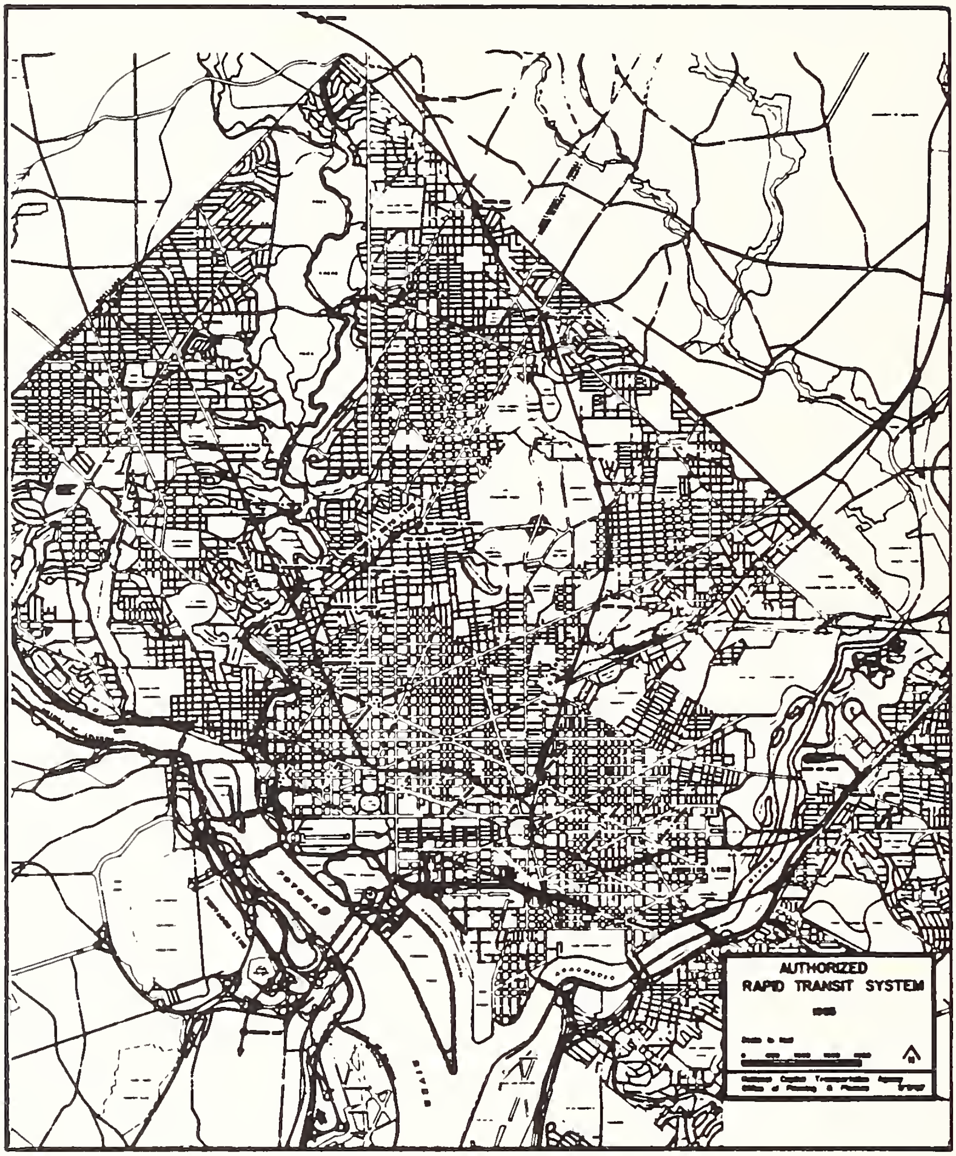
Two years later, Congressional concern over the patronage of certain segments of the Authorized System of 1965 resulted in modifications to add service to the Independence Avenue, southwest Washington, D.C. area, and to eliminate the Columbia Heights Line (Basic System as Modified, 1967). A patronage study by Alan M. Voorhees and Associates, indicated that the Columbia Heights Line would not be economically feasible, that the expanded federal employment in the southwest had a greater demand for service than originally estimated, and the result of not providing extra service would be excessive congestion.

NO-ACTION ALTERNATIVES

In the chronology of Metro planning to this point, two no-action alternatives have been mentioned. The first involved the Auto-Dominant Plan which was included as one of the three alternatives in the Mass Transportation Survey of 1959. This plan was rejected by the National Capital Transportation Agency ln 1962 due to the impossible peak hour traffic loads in many of the radials downtown, because of the disruption required by highway construction, and because it could not serve the rapidly growing metropolitan area. The second no-action alternative was part of the All-Bus Rapid Transit Plan, also proposed in 1959 by the MTS. This alternative was rejected by the NCTA because no matter how greatly improved, "bus service almost certainly would not draw enough people to public transportation to solve the region's problems". Furthermore, the NCTA found that improved bus service was more costly than a combined highway and rapid rail system and that despite the high cost it would lack the exclusive rights-of-way which characterize successful rapid transit systems.

A third no-action alternative confronted the region during the period between 1965 when the 25 mile rapid transit system received its authorization and 1967 when WMATA was created and given the responsibility of expanding the basic system to serve the region.

25 MILE BASIC PLAN – 1965



At that point, an alternative would have been to stop with the construction of the 25 mile system. The consequences of that alternative in terms of unrelieved traffic congestion, further decentralization of employment and declining employment opportunities for inner city residents mounted public pressure in favor of a truly regional system.

WMATA ALTERNATIVES - PRE-ARS 1968

On October 1, 1967, the WMATA officially assumed responsibility for the 25 mile authorized system from NCTA, along with the additional authorization to expand the system to serve the region. Expansion of the Metro system to the suburbs necessitated the formation of an interstate compact because of the involvement of two states and the District of Columbia, as well as the counties and municipalities of suburban Washington. This compact was intended by Congress in passing the National Capital Transportation Act of 1968.

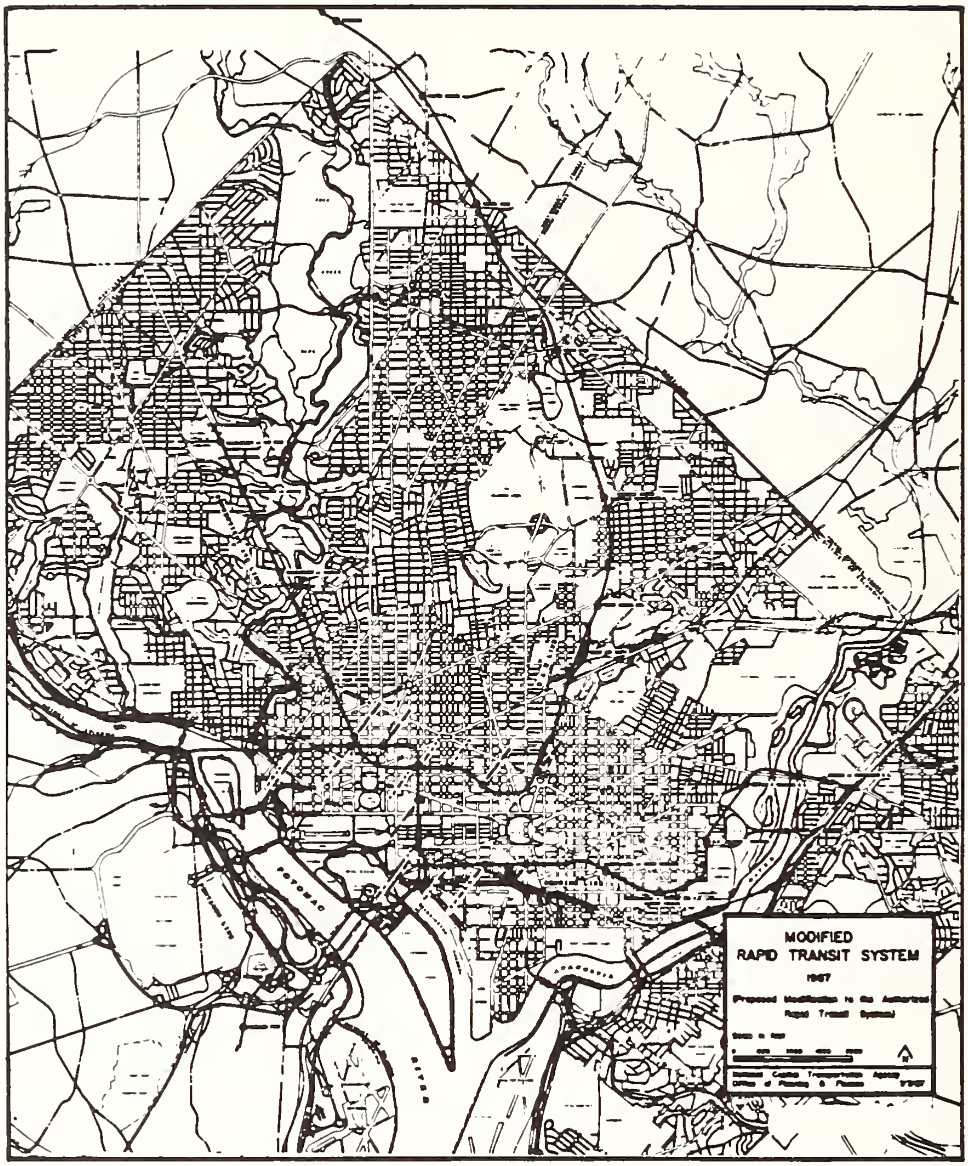
The Modified Rapid Transit System of 1967

In December 1967, the basic transit system was modified to include the Benning Line serving southwest Washington, D. C. at Independence Avenue, southwest Washington at Pennsylvania Avenue to Potomac Avenue, the Stadium Armory, and Benning at Kenilworth Avenue. It eliminated the Columbia Heights Line which branched off the Connecticut Avenue Line at Columbia Road. This modified Basic System of 1967 established the core of the Metro System, to which only minor modifications have been made. Substantial changes have been made only to expand this basic system to a regional system serving the Virginia and Maryland suburbs.

Reaction during the Congressional hearings on the modifications to the Authorized System of 1965 was generally favorable. The Modified System of 1967 was supported by eight local governments, one regulatory group, nine planning agencies, two transit companies and one labor union. The District of Columbia's representative supported the modifications when assured that the regional plan for expanding the basic system would include service to north central Washington eliminated with the Columbia Heights Line.

Opposition to the modifications was directed at the the elimination of the Columbia Heights Line, by the citizens and businessmen of the area served by that line.

BASIC SYSTEM AS MODIFIED – 1967



Groups representing these interests argued that removal of the line would deny access to jobs for an area of the city with dense population, low income, and low car ownership rates, and would destroy the potential for 20,000 jobs programmed for the area under the comprehensive plan. They felt that the neighborhoods served by this line would become slums. It was argued the low patronage figures of the Voorhees report was primarily due to the numbers of low income workers that travel in off-peak hours, and to the longer waits caused by the branch design of the line. The Modified Rapid Transit System was adopted December 20, 1967, after unanimous support of both District Committees.

The Regional Test Alternatives

Prior to the official transfer of authority from the National Capital Transportation Agency to WMATA, an important conference was held in December 1966 at the Airlie Foundation conference headquarters in Warrenton, Virginia, to identify tasks and objectives and to establish the new agency's program for achieving those objectives. The workshop was intended, in part, to determine how WMATA might direct its early efforts. Attended by representatives and staff of local governments in the region, local and regional planning agencies, and state and federal government agencies, the Airlie Conference established an early action program for WMATA aimed at producing a regional rapid rail transit plan to be implemented as early as possible and to be based upon previously accomplished analysis. This analysis included the National Capital Regional Planning Commission's Regional Development Guide, the latest highway plans, and NCTA's 1962 modal split model, which was to be used along with other original analysis performed by WMATA staff and consultants in testing alternative transportation systems. The consultants and Staff of NCTA and WMATA recommended three alternate systems based on previous route planning and projections for future developments after a series of tests of construction and operating costs, revenues and financing. A major effort was made to incorporate in this early analysis all regional plans and proposals, as well as transit system recommendations incorporated in city and county master plans.

Each test system incorporated the 25 mile Basic System already established. Other major factors in the early design of test system were alignments that would create the least disruption to existing neighborhoods, existing land use, forecasts of population and employment, and historic bus and automobile travel patterns. As a consequence, the test lines were routed along existing rights-of-way, highway medians, vacant land, and below existing streets wherever possible. Station

locations were generally located at focal points of the arterial street system, where station spacing requirements permitted.

The results of the alternative test studies were presented to the new authority over an eight month period, beginning shortly after it assumed responsibility, in February, 1967. At a second conference at the Airlie Foundation in Warrenton, in July 1967, (Airlie II), it was agreed that a fourth alternative should be studied. The four alternative test systems studied during this process are discussed briefly below. The alternatives are discussed in greater detail in five technical documements prepared by WMATA in 1967, entitled System Planning Capital Cost Analysis Traffic Forecasts, Operating Cost Analysis, and Financial Program.

Alternative Test System A

System A had seven radial lines converging on downtown Washington with six serving center city. One line merged into the 7th Street line from the two southern lines serving Brandywine, Sideburn, and Colchester. Five of the lines were in Maryland, three in Virginia, where one served as a branch between Rosslyn and the Pentagon. Two of the Virginia lines branched at the outer portions to serve other communities, although with less frequent service. System A consisted of 154 miles of line with 37 miles in D.C., 57 in Virginia, and 60 in Maryland. It had 100 stations and provided for 55,500 parking spaces, mostly at the suburban stations in Maryland and Virginia. The total capital cost estimate, including escalation was $3.0 billion. Annual operating cost (1990) was estimated at $34.5 million, and revenues (net after depreciation) at $41.7 million.

Alternative Test System B

Eight radial lines were recommended for test system B, seven of which converged on downtown Washington. The eighth, the Columbia Pike Line, served Rosslyn via the Pentagon Station before proceeding to downtown Washington. The two southern lines, one each in Maryland and Virginia, converged into the 7th Street line similar to System A. System B consisted of 168 miles of rapid transit, 36 in D.C., 72 in Virginia, and 60 in Maryland. System B had 113 stations, with 60,000 parking spaces. Capital cost estimated for System B was $3.5 billion. Annual Operating Costs (1990) were estimated at $36.3 million, and revenues (net after depreciation) at $28.6 million.

Alternative Test System C

Ninety miles of commuter rail service on existing railroad rights-of-way was used with System C in conjunction with 70 miles of new rail rapid transit lines. The total 160 mile system included 24 miles of rapid rails and 11 miles of commuter rails in the District of Columbia; 26 miles of rapid rails and 41 miles of commuter rails in Virginia; and 20 miles of rapid rails and 38 miles of commuter rails in Maryland.

The system had six lines converging on downtown

*Second paragraph expanded

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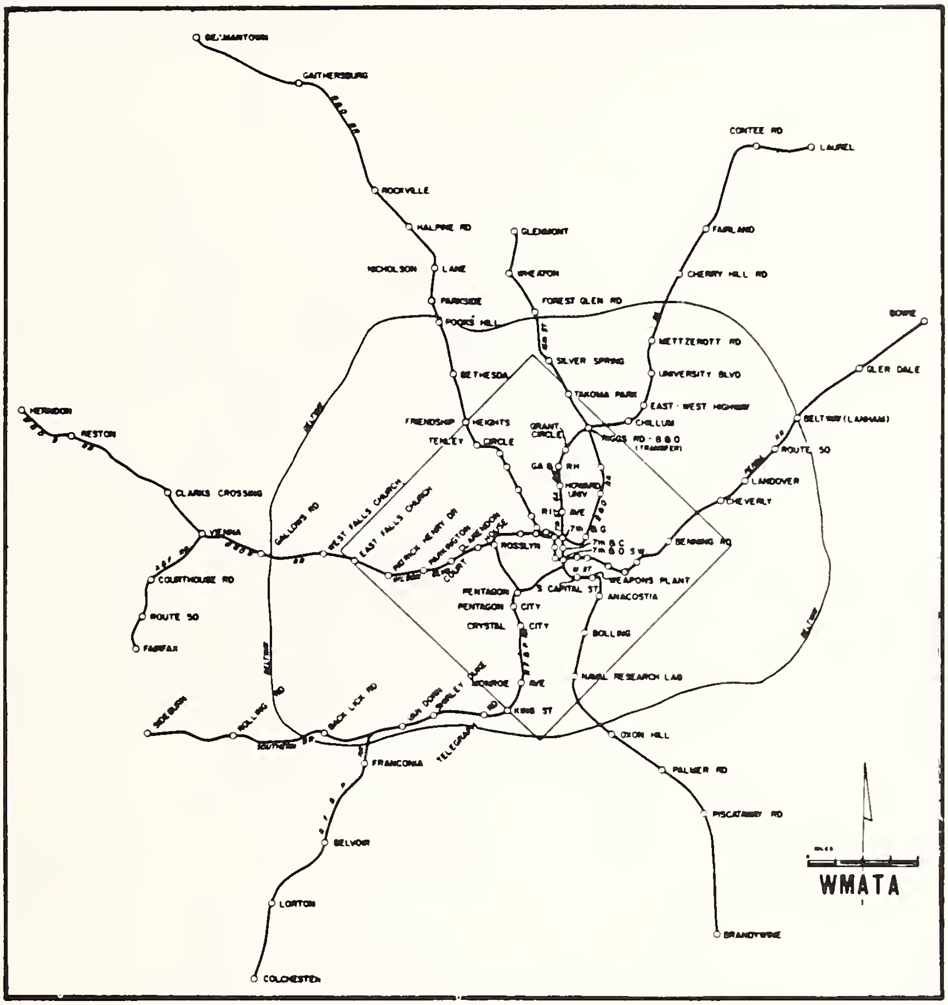
ALTERNATIVE TEST SYSTEM A

RAPID RAIL TRANSIT

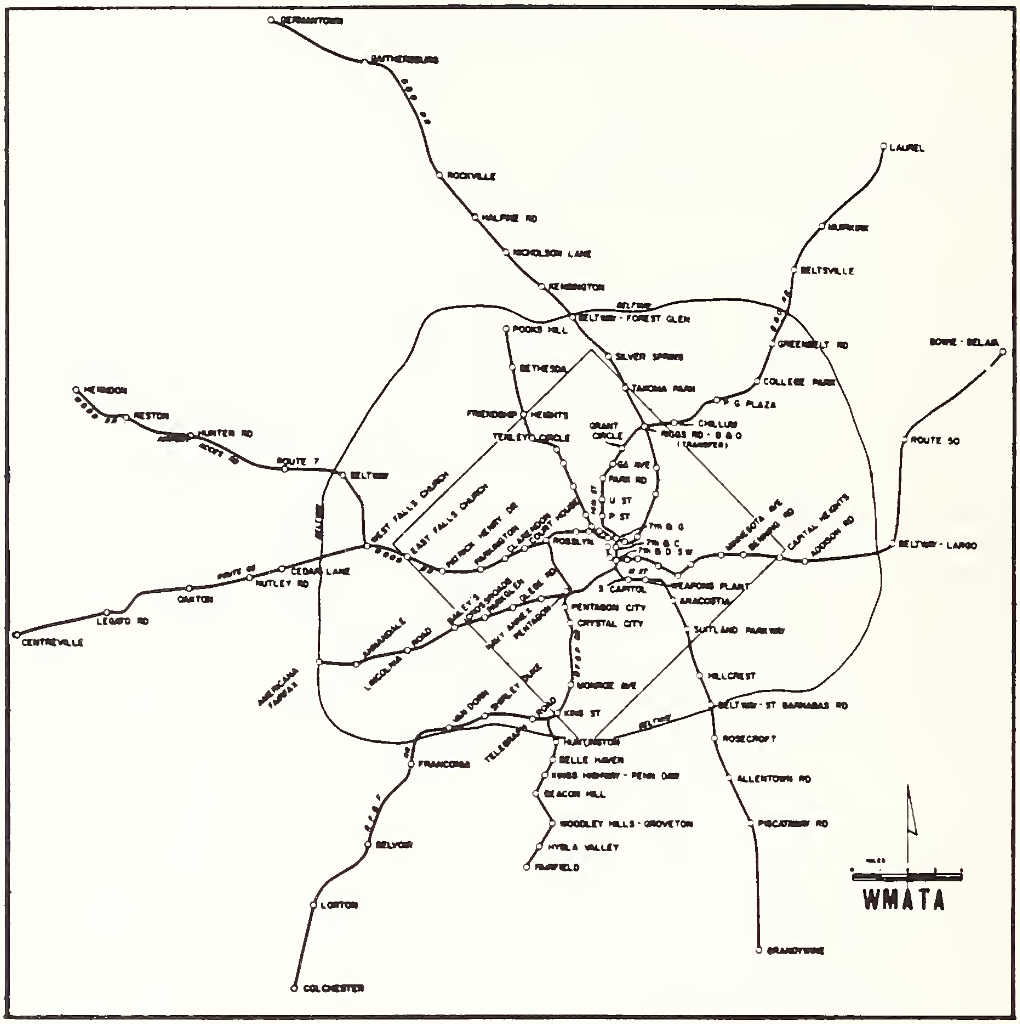


Source: WMATA System Planning—December 1967, page 25

Map 16

ALTERNATIVE TEST SYSTEM B

RAPID RAIL TRANSIT



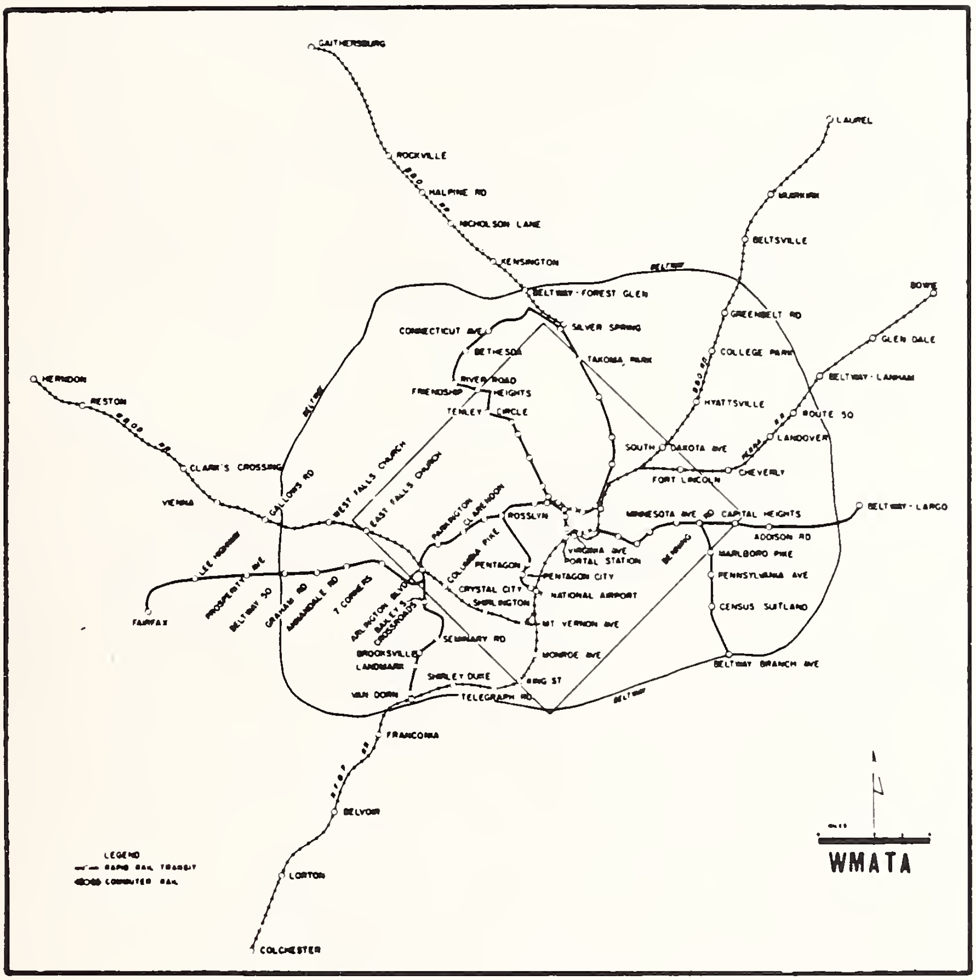
Source: WMATA System Planning—December 1967, page 27

Map 17

ALTERNATIVE TEST SYSTEM C

RAPID RAIL TRANSIT

COMMUTER RAIL



Source: WMATA Planning—December 1967, page 29

Map 18

with two of the lines providing commuter rail through service. To the northeast the proposed commuter rail service along the Baltimore and Ohio Railroad, and the Pennsylvania Railroad tracks merged into one line connecting with a commuter rail line from Virginia. The Virginia Line, on the RF & P lines from the south, and the Washington and Old Dominian Railroad lines from the northwest, merged south of Crystal City Station. An additional commuter rail shuttle connected the Silver Springs station with Gaithersburg on the B & O Railroad lines.

System C contained 106 stations, 61 rapid rail and 45 commuter rail, and provided 54,100 parking spaces, 21,600 at rapid rail and 32,500 at commuter rail stations. Test System C was estimated at $37.1 million annual operating cost and $28.6 million net revenue after depreciation (1922). Of the four alternatives considered, System C provided a low level of service and the least favorable relationship of revenue to operating costs.

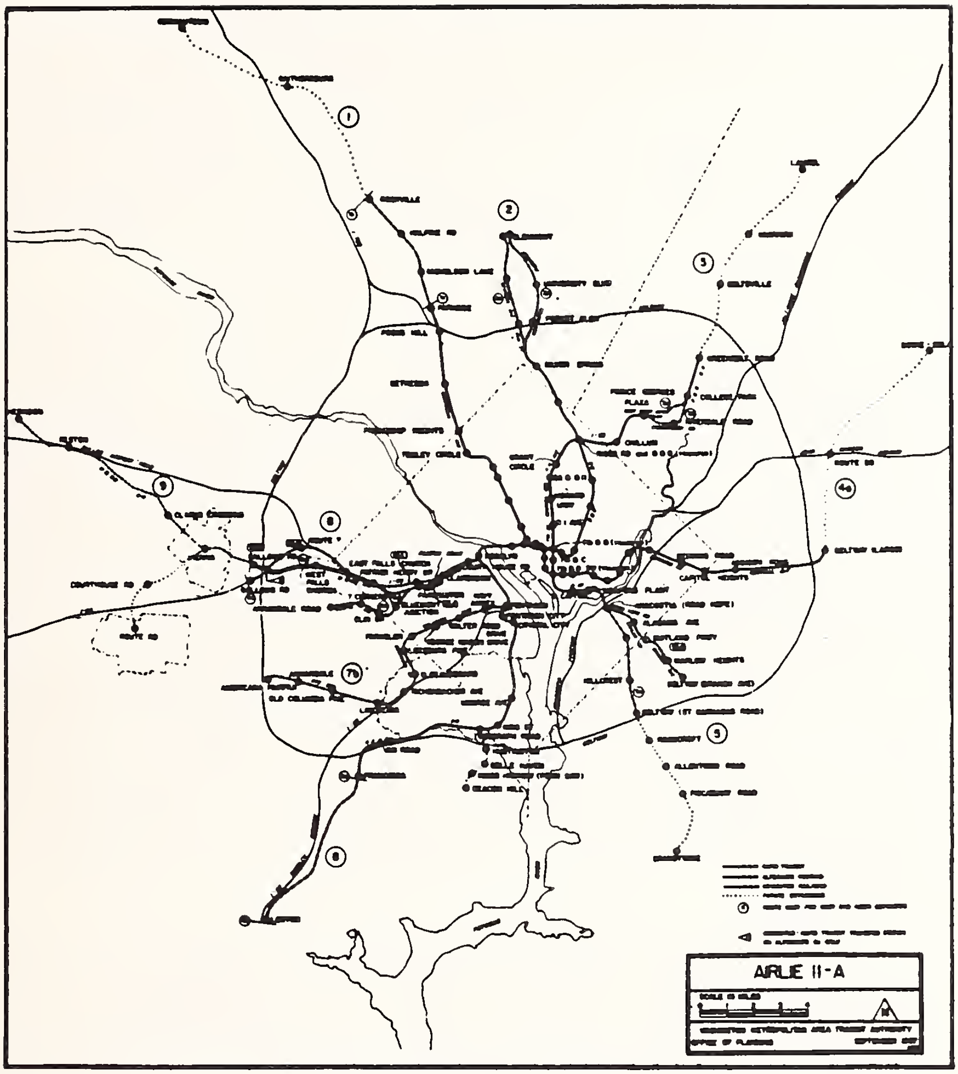
Airlie IIA

Features of all three alternative test systems were used in addition to new proposals for the fourth alternative suggested at the Airlie II conference. It included transportation service in all corridors tested in System A, B, and C, but provided alternative alignments within each corridor. The northwest line was extended up Wisconsin Avenue to Rockville. An alternative was suggested for the Georgia Avenue alignment to Glenmont. The 7th Street line was connected to the northeast corridor line terminating at Greenbelt Road. The eastern service was provided the same as in System B along Central Avenue, but it terminated at Largo with a future extension considered for the rest of the line to Bowie. The Anacostia Bridge crossing was moved to north of Benning Road. The Alternative B Alignment was followed to the southeast as far as the Capital Beltway. A second route to Branch Avenue was considered. The line serving the present Huntington Route corridor was taken from Systems A and B, without the branches to Sideburn or Fairfield. The original service considered to Colchester was stopped at Franconia with future extension considered to Lorton. The System B connection to Americana Fairfax was an alternate for consideration, but along the Columbia Pike, Seminary Road, Route 236 Corridor. The Potomac River Crossing to the Pentagon was dropped from consideration in the Airlie IIA proposal. The westerly corridor along Wilson Boulevard, with alternates, was similar to System A, but terminated at Gallows Road with rail service connection to Herndon.

The Airlie IIA System consisted of 90.8 miles of transit, 34.7 miles of which were in the District of Columbia, 33 miles in Virginia, and 23.1 miles in Maryland. It contained 79 stations, of which 42 were in the District, 21 in Virginia, and 16 in Maryland. The

*Second paragraph expanded

AIRLIE 11-A



Source: WMATA System Planning—December 1967, page 47

Map 19

system was estimated at $2.25 billion in capital costs and $28.75 million annually for operating costs (1990). Net revenues after depreciation were estimated at $35.5 million (1990).

The results of testing the Airlie IIA alternative were presented at a third conference (Airlie III, although held in Washington, D.C.) in October 1967. At a summary meeting, where each jurisdiction made its recommendations, WMATA unanimously recommended that the Proposed Regional Rapid Rail Transit System, based primarily on the Airlie IIA system be presented to the public for acceptance. Of the four systems studied, this system provided a high level of service combined with the most favorable relationship of revenues to operating costs.

The Proposed Regional System of 1967

Whereas the 25 mile Basic Authorized System was well-established and the WMATA officials agreed to permit each jurisdiction to decide where rail service would go in their area, the Proposed Regional System (PRS '67) had the broad support of public agencies and officials that had been involved in the conferences from which it evolved. This proposed system was presented with a complete program for implementation of construction and operation at an extensive series of public hearings in Maryland, Virginia and the District of Columbia in order to elicit public response.

PRS '67 consisted of seven branch lines serving the downtown and crossing or closely approaching the Capital Beltway. In Virginia, the Wilson Boulevard line was extended by means of a shuttle commuter rail service from Gallows Road Station to Herndon. Extensions were anticipated on most of the lines to reach further beyond the Beltway into the outlying suburbs of Maryland and Virginia.

The total system of 95.5 miles included 34.7 miles in the District of Columbia, 27.7 miles in five lines extending into Maryland, and 33.2 miles in two lines to Virginia. Eighty-two stations were distributed throughout the system with 42 in the District of Columbia, 20 in Maryland and 20 in Virginia. In connection with the stations, 24,420 parking spaces were provided, mostly in Maryland and Virginia. Total capital costs for the Proposed Regional System were estimated at $2.36 billion, annual operating costs at $36.6 million. Total 1990 net revenues after depreciation were estimated at $40.4 million annually, (1990).

Benefits of the Proposed Regional System were cited generally as including the service it would provide to the community at large, its adaptability through changing operating schedules and extension of routes, and the indirect benefits to street and highway users of relieving congestion. Other benefits noted were the increased accessibility between activity centers, improved labor market for expanding employment centers, an enlarged job

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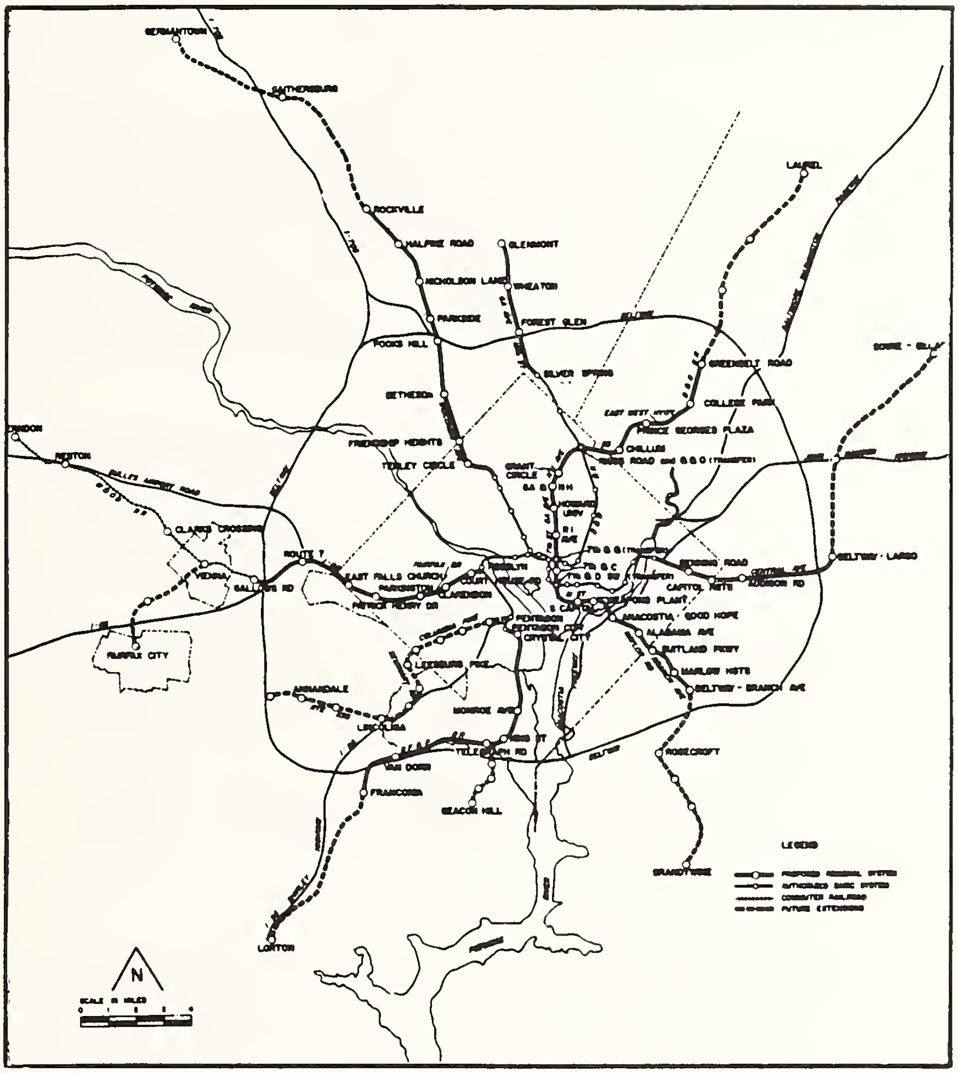
PROPOSED REGIONAL SYSTEM 1967



Source: WMATA System Planning—December 1967, page 53

Map 20

market for low-income workers, and the interaction of transportation improvements and metropolitan growth allowing the Metro improvements to help mold the future growth of the region.

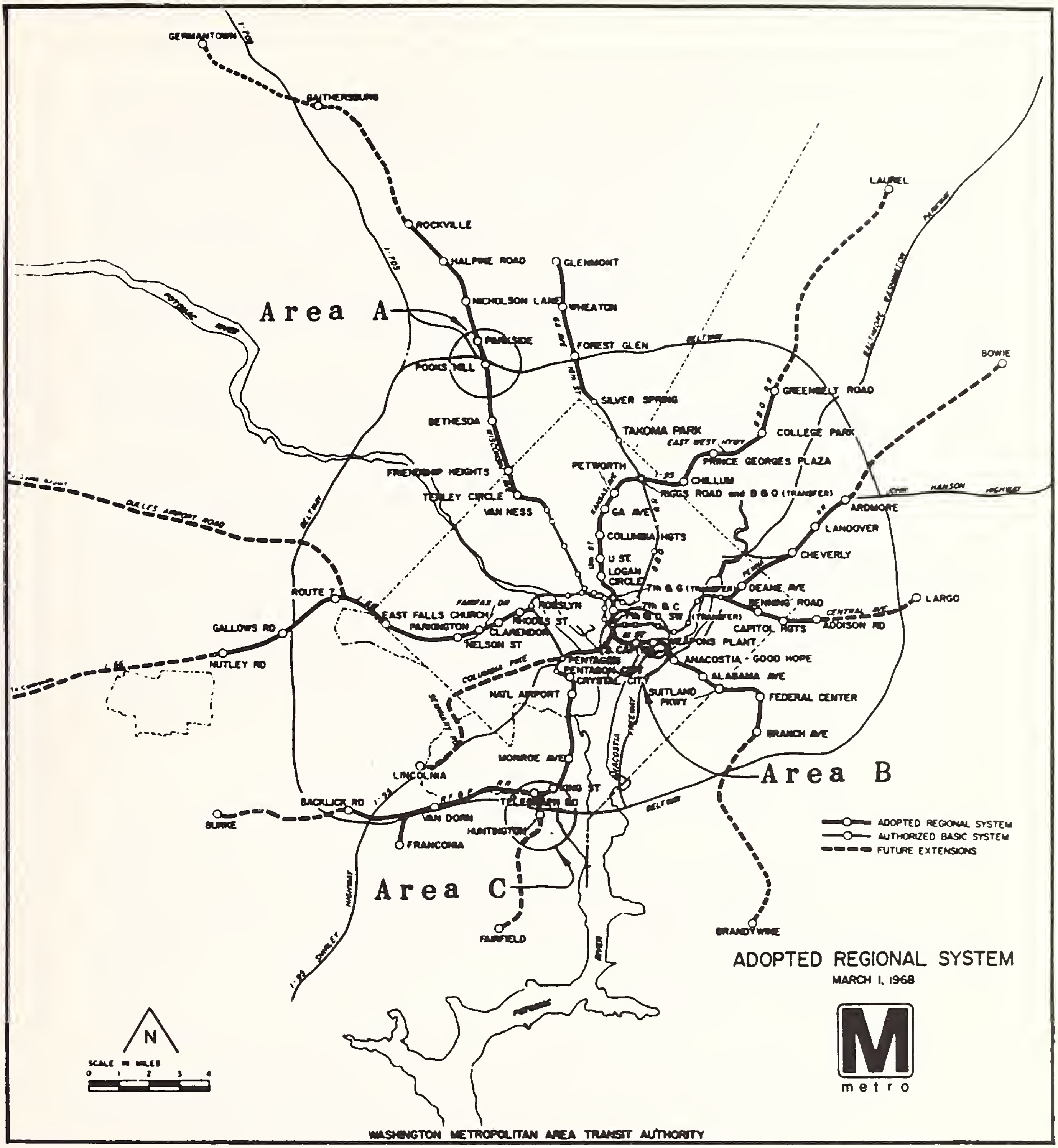
THE ADOPTED REGIONAL SYSTEM OF 1968

The public hearings of 1968 resulted in several major changes to the Proposed Regional System prior to its adoption. Some of the testimony from those hearings was criticism of the system which continued after the regional system was adopted in 1968, and resulted in later modifications to the Adopted Regional System. Major changes between the Proposed Regional System of 1967 (PRS'67) and the Adopted Regional System of 1968 (ARS'68) were:

- a change in alignment of the Greenbelt Route from 7th Street to 13th Street to respond to the demands of members of the 14th Street Merchants Association who had complained that the 7th Street route would force them out of business;
- a spur or branch of the Benning Road Route to serve the already built-up communities along the Pennsylvania Railroad tracks and Route 50, rather than the relatively undeveloped area of Largo;
- a second crossing of the Potomac River was included to improve service to the Pentagon, Alexandria and other Virginia communities;
- a change in the southerly route in Virginia (C) to serve the community of Huntington with a cutback from a previous Beacon Hill terminal with a future extension to Fairfield, and included a branch to Backlick Road with future extension to Burke, replacing the future extension from Franconia to Lorton; and
- an extension of the I-66 Route to Nutley Road with additional stations; and a change in alignment south of Vienna, including future extensions to Dulles Airport and Centerville.

Modifications to the Adopted Regional System

On February 7, 1969, WMATA revised the Adopted Regional System to incorporate changes originally proposed during the 1968 hearings, which were studied more thoroughly thereafter by the WMATA staff. The



ADOPTED REGIONAL SYSTEM ARS—1968

proposed changes that were adopted after public hearings in January 1969 were:

- The relocation of Pook's Hill Station on the Rockville Route south to Medical Center near the National Institutes of Health on Wisconsin Avenue.
- The relocation of the station at South Capitol and M Street to 4th Street, SW. (Now Waterfront Station).
- The shifting of the Huntington Route westerly in the direction of Telegraph Road, between Telegraph Road Station and Huntington Station.

The general locations of these changes are shown in Areas A, B, and C respectively on the map entitled Adopted Regional System 1968, as Revised March 1969.

On June 11, 1970, the WMATA Board of Directors again modified the Adopted Regional System in adopting the "Mid-City Alternative", which moved the Greenbelt Road (E) Route from its former alignment up Massachusetts Avenue, 13th Street and Kansas Avenue, to 7th Street, "U" Street, and 14th Street to Kansas Avenue, to better serve this northeast portion of the city. This request from the District of Columbia resulted in a $3 million extra cost to the District in accordance with the established WMATA policy that additional costs due to changes requested by a jurisdiction after the approval of the system are borne by that jurisdiction.

CURRENT TRANSIT PLANNING

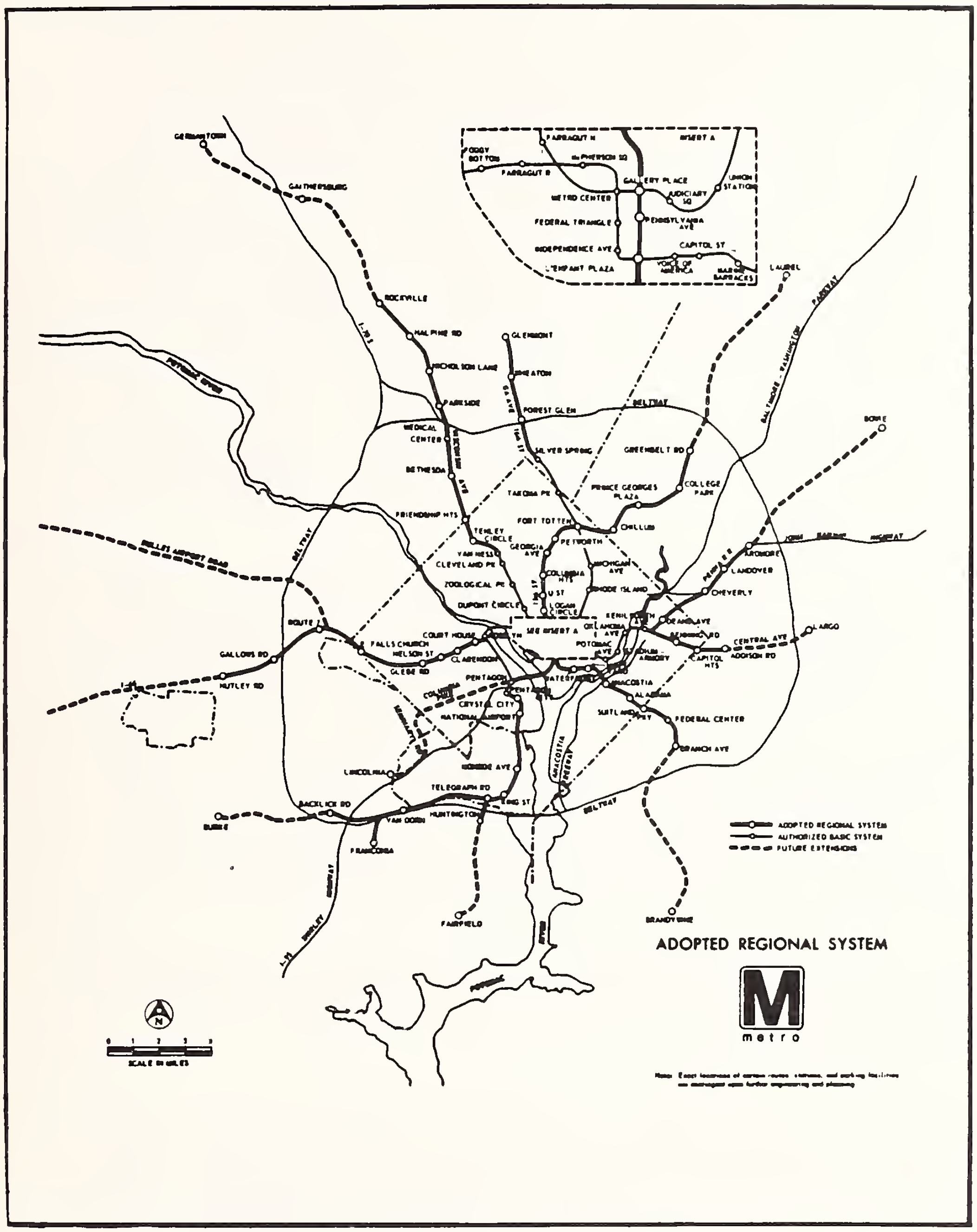
Since adoption of the regional system, WMATA has been working with the COG, local public agencies and neighborhood groups to develop detailed transit plans which fully explore alternatives within the ARS and are coordinated with both regional and local plans.

Regional Planning

COG is responsible for comprehensive planning for the metropolitan area. As the official regional planning agency and the metropolitan clearinghouse for publicly assisted projects, COG serves as coordinator with federal, state and local agencies to ensure that transit related plans and studies are compatible with regional and local planning objectives. COG is responsible for both comprehensive planning and transportation planning. With the assistance of transportation agencies such as WMATA, COG prepares a 5 year transportation plan for the region. It works with the Federal Department of Transportation and state highway departments to

ADOPTED REGIONAL SYSTEM ARS—1968

AS REVISED MARCH 1969



Source: WMATA

Map 22

see that highway development is in conformity with this plan. In addition, COG works with WMATA to coordinate transit and highway planning. The COG regional transportation plan included the Adopted Regional System for Metro.

Recently COG received a $3.1 million federal grant from the Urban Mass Transit Administration (UMTA) to undertake a Unified Comprehensive Short Range Transit Development Program for the Washington Metropolitan Area, which will integrate transit planning studies and projects by 12 public agencies in the region with the plans for Metro.

The major elements of the study work program have been grouped into seven categories, including: improvements to existing transit systems, consolidation and integration of existing transit with Metro system, transit station impact studies, transit station access studies, special studies, development of programs, and overall coordination and supporting services.

The objectives of this effort were expressed by COG in its Study Design, issued by COG's Transportation Planning Board.

1. To integrate and consolidate all current and proposed short-range transit planning studies and projects by the many regional, subregional and local agencies in the Washington Metropolitan Area into a coordinated, unified, comprehensive short-range transit development program.

2. To provide a basis for qualifying the Washington Metropolitan Area for two-thirds Federal capital grant assistance for transit improvements.

3. To provide a technical and organizational framework for the orderly implementation of transit improvement plans and programs resulting from the various studies.

4. To provide a frame of reference for a continuing program of appropriate transit planning studies and projects consistent with long-range comprehensive planning for the region.

The work program elements of particular regional significance are those directed at improvements to the existing transit system, consolidation and integration of existing transit with Metro system, special studies and development of programs. These activities will be carried out by COG and WMATA in conjunction with the Maryland National Capital Park and Planning Commission (MNCPPC), the Northern Virginia Transportation Commission (NVTC) and the Washington Suburban Transit Commission (WSTC). The Transit Station Impact Studies are designed to provide a coordinated area-wide approach to development planning around Metro Stations, but are of more significance at the local or sub-regional level and will be

discussed with local planning. Similarly, the Transit Station Access Studies, are addressed to local traffic volumes and flows into and around stations, therefore, will be discussed at the local planning level.

While bus service is not the subject of this Study, a brief description of plans for bus and rail service has been included because feeder bus service is critical to the optimal operation of Metro.

WMATA anticipates that about two-thirds of the Metro passengers will use buses to and from Metro stations. Without good bus service, Metro will lose ridership. This is particularly applicable in the District where there is a policy to discourage park-and-ride passengers by not providing parking around stations. Feeder bus service is also important for the reverse-haul commuter living in the urban and suburban centers and commuting by Metro to outlying suburban areas not directly served by Metro. In addition, since many important transportation corridors will not have rail service in early phases of Metro construction, failure to provide efficient bus service could lead to traffic problems tending to negate the benefits of rail service.

Because of the importance of coordinated bus and rail service and in view of the decline in transit passengers in the Washington metropolitan area (transit passengers dropped from 147.2 million in 1969 to 128.8 million in 1971), WMATA was given the responsibility for consolidating bus and rail service.

Four privately owned bus companies have until just recently provided service consisting of a large number of radial and trunk routes linking the core area of Washington with various residential communities in the District and Maryland and Virginia suburbs. A limited amount of cross-town and cross-county service was also provided

Legislation authorizing WMATA to acquire the four bus companies and consolidate operations was recently passed based on the rationale that it could result in substantial financial savings and better transit service by:

- eliminating overlapping and competing routes;
- eliminating duplication of management and maintenance facilities;
- improving scheduling and utilization of equipment and personnel;
- consolidating purchasing arrangements; and
- generally encouraging coordination rather than competition.

WMATA plans to be operating the unified bus system by 1973 before the first rail service is initiated. In

order to prepare for the orderly integration of bus service with Metro, WMATA has begun a series of Transit Technical Studies as part of the larger COG/UMTA Study. One of the important initial products of WMATA's studies will be an "Optimum 1974 Service Plan" to complement the first phase of Metro operations. This plan will be designed to achieve:

- efficient feeder and distribution service to and from initial Metro stations;
- proper line haul capacity to service important traffic generators outside the initial rapid rail service area; and
- effect cross-town and cross-county and neighborhood service.

Eventually WMATA plans an extensive redesign of the present bus system to alter the primary function of buses from trunk line operations to feeder and local service operations with much greater attention given to cross-town and cross-county routes. WMATA anticipates an integrated rail bus system serving 352.0 annual transit trips in 1990; 78.1 million of these trips to be by rail only, 78.3 million by bus only, and 195.6 million involving a combination of rail and bus.

Local Planning

In addition to bus-rail coordination at the regional level, WMATA is working with local jurisdictions to plan for Metro stations and the areas adjacent to stations.

Using the Adopted Regional System as a basis, the WMATA Office of Planning has been developing a site plan for each station. The site planning process involves studying a number of alternative station configurations and circulation patterns. The site plan locates the necessary bus bays, parking lots and plots the actual station configuration including locations of platform and access points and the projected traffic circulation around the station.

The site plan is then reviewed within the WMATA organization at a joint meeting of representatives of the Offices of Operations, Planning, Engineering, Real Estate and Architecture (OPERA). Members of the WMATA Office of Community Services relay citizen comments obtained at formal and informal meetings on the stations and alignment.

After internal review and revision, the station site plans are reviewed at both the regional and local jurisdictions through the Northern Virginia Transportation Commission, Washington Suburban Transit Commission, the District of Columbia Office of Planning and Management, commissions and the planning and public works staffs.

After public review at both the regional and local levels, more detailed plans are drawn from the site plans as revised. These plans, called general plans, are first reviewed by the transit authority and then taken to the local jurisdictions for further review. The public is encouraged to comment on station plans at scheduled public hearings. Testimony presented at the hearings is reviewed by the WMATA Board. After incorporating any changes as a result of public hearings, the Board approves the plans and the final design stage begins.

Alternative station locations and designs are WMATA's primary concern at the local level, however it is also working with jurisdictions to resolve planning issues that arise in conjunction with Metro. Changes in traffic circulation, for example, will be required at some stations. Parking demand generated by stations, and provisions to meet this demand are developed in cooperation between WMATA and the jurisdiction served: while WMATA is responsible for provision of those parking places at each station that are part of the adopted system as devised, additional parking places may be provided, funded by the local jurisdiction, where the local jurisdiction determines that such provision would relieve parking demand on adjacent streets. Parking demand is quantified in access studies discussed below. Capital improvements will be required to handle increased pedestrian and vehicular activity. Zoning changes may also be necessary to regulate future development around some stations.

The Transit Station Impact Studies, of the WMATA/COG development program are being carried out primarily by subregional and local government planning agencies, with the overall coordination and supporting services of COG. The studies provide a coordinated area-wide approach to development planning around stations, but allow individual agencies to be responsive to their respective jurisdictions' needs and priorities. The staging of these studies is coordinated directly with Metro staging plans.

Initially, COG analyzes accessibility changes with respect to development potential at transit stations, using the EMPERIC model as a forecasting device.

Each of the subregional agencies, NVPDC, MNCPPC and the District Office of Planning and Management is then responsible for inventorying of physical development and socio-economic station impact data at the jurisdictional level, and for synthesizing, analyzing, and evaluating this and the accessibility information to identify problems and opportunities to be considered in plan development, in coordination with WMATA.

Based on station development priorities established in this process, the subregional and local planning agencies will prepare studies to include economic analy-

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sis, development of alternative land use arrangements, estimates of public and private investments required for alternatives, and recommendation for implementing desired development.

The Transit Station Access Studies are being conducted by the Virginai Department of Highways, the Maryland Department of Transportation, and the District of Columbia Department of Highways and Traffic, because they are responsible for improvements to highways and traffic facilities around the Metro stations. WMATA

has prepared traffic and circulation studies for Metro stations, and is coordinating these studies with those of the other state agencies.

The access studies are to consider existing deficiencies in highway facilities, additional highway capacity required to serve traffic volumes generated by the Metro system, additional highway capacity required to service land development generated by Metro stations, normal traffic growth, and effect of Metro ridership in reducing peak traffic volumes, particularly on radial arterial routes. Coordination of land development impact planning and the traffic impact studies could lead to the incorporation of needed highway capacities into the development proposals of a station site, and the construction of needed highway improvements by the developer.

The access studies will include the following phases:

- station access inventories of facilities within the station impact area;
- station access traffic analysis of probable deficiencies in the highway system and additional required capacity to serve the projected development;
- alternative access measures considered in providing additional highway capacity, the feasibility of providing the improvements, and their compatibility with the character of the area;
- recommended improvements for each station area; and
- station circulation studies including pedestrian, cycle, bus, and automobile movements to minimize inconvenience and safety hazards.

The Special Studies by COG, WMATA and other agencies will involve the investigation of new transportation systems, such as "people-movers', institutional and policy analysis, parking policy within the the Central Employment District, and transit impact on public safety.

Other major state and local planning studies which are not a part of the original WMATA/COG Study Design are currently underway and illustrate the local commitment to Metro related planning. For example, the Maryland Department of Transportation has begun the Western Prince George's County Transportation Alternatives Study to determine the need for additional future transportation services within a north-south corridor in the western portion of the county. All feasible modes of transportation are being investigated including alternative routes for Metro and the proposed interstate highway I-95. The alternatives are to be evaluated on the basis of transportation services provided, environmental impacts, social and neighborhood effects, economic development and growth implications, and transportation improvement costs.

An interdisciplinary environmental team of professionals from state and local agencies and community wide environmental interest groups advises the staff and consultants on technical aspects of the studies. Both WMATA and WSTC are represented on the Steering Committee for the study, which is composed of county-elected officials, State, local and federal officials, and community representatives from civic associations, environmental groups and business interests.

Another example is the recently released (December 1972) Friendship Heights Preliminary Sector Plan, prepared by the Montgomery County Planning Board of The Maryland National Capital Park and Planning Commission. This plan represents a proposed amendment to the Bethesda - Chevy Chase Master Plan, and contains detailed recommendations for land use, development, and transportation for the Maryland portion of Friendship Heights. WMATA staff worked with the planning staff preparing this report, to insure that the proposed plans for Metro facilities would be coordinated with the proposed plans. Metro ridership was a strong factor in the analysis and the policy recommendations. For example, the Sector Plan recommends intensifying development only on parcels immediately adjacent to the transit station and calls for a reduction of development intensity on parcels at a greater distance from Metro.

To assist in its planning for transit stations, Montgomery county has formed the Citizens Advisory Committee to study zoning in Central Business Districts and Transit Station Areas (Blue Ribbon Committee).

The Friendship Heights Sector Plan was produced as a result of a recommendation of this committee in its first report issued in February, 1972.

In addition, Advisory Committees composed of representatives of citizen's associations, property owners, and other community organizations are formed for each major Central Business District and Transit Station Area in the county to advise the county government on planning, land use, development and transportation in these areas.

In the District, WMATA is working with the District of Columbia Office of Planning and Management which has been coordinating planning and development for the Metro station areas. This office has organized a planning procedure which involves continual public review of station area plans as they develop.

The implications of more extensive bus service in lieu of portions of the rapid rail system are discussed in more detail in Appendix D, Metro System Characteristics and Appendix H, the Air Quality and Energy Study in Part 3 of this Report, Appendices. Further analyses of the relationship of commuter rail lines to the rapid rail system are discussed in Route Environmental Statements available from WMATA.

*Additional paragraphs added REVISED

STATION LOCATION POLICY

Station locations along the system's routes are determined by WMATA on the basis of travel demand, locations of existing and proposed employment centers and high density residential areas, existing major road and highway patterns, appropriate spacing between stations, and availability of land for station construction.

Each Metro station including its access facilities goes through a planning process which culminates with a WMATA Board of Directors resolution defining the station and its facilities. The process includes an in-house WMATA Technical Committee called the OPERA Committee. It gets its name from the participants: O-The Office of Operations; P-Planning; E-Engineering; R-Real Estate; and A-Architecture. Several other offices of the Authority, including Program Control and Construction, have become active in OPERA. Personnel from each State and the District also participate. OPERA is chaired by the Office of Planning. The purposes of OPERA is to resolve the sometimes conflicting goals of its participants.

Site and station plans are presented to OPERA early as concepts. After local coordination, OPERA again reviews them. If approved, they are incorporated into the general plans. The general plans are subsequently taken to a public hearing and then to the Board for resolution.

Specific factors in determining station location and station design are discussed briefly below. These factors include travel demand, character of surrounding neighborhoods, existing population patterns, potential station impact, traffic analysis, mode of arrival, feeder systems, property ownership and type of construction.

Travel Demand

Travel demand is projected on the basis of projections of population, residential development patterns and employment centers throughout the region.

Travel demand has been projected through 1990 as a part of the Net Income Analysis report on the Adopted Regional System. These projections did not assume a specific number or specific locations of access points, thereby permitting refinement of location on the basis of other criteria.

A major conflicting criterion with the criterion of travel demand in station location is that of system efficiency. Station stops add time to rail transit travel, which reduces rail transit's advantage over other modes. So, demand and system speed must be balanced to achieve the most favorable combination of both factors.

Character of Neighborhood

The station location process takes into account both the character of existing adjacent neighborhood and community development patterns.

As route location corresponds to the regional land use concept plan of corridors and wedges, so station location corresponds to existing and planned population commercial and employment centers along those corridors. General location is determined by the location of these centers. Specific location and design are determined by the character of these centers.

Close and continuing coordination with local governments is necessary in determining both general and specific station location.

Existing Population

Existing concentrations of population are a major determining factor in the location of Metro stations both as centers of existing travel demand and as indicators of future development patterns.

Existing population figures and past population growth trends are inputs in the Net Income Analysis which projects Metro ridership by jurisdiction throughout the region.

Potential Station Impact

Appendix E of this study presents a bibliography of studies prepared to date concerning projected impact of proposed Metro stations upon immediately adjacent areas and upon the subregion in which they are located. These studies serve both to articulate current local policies concerning anticipated station impact and to bring together impact data and projections that allow for further local consideration of both the opportunities and problems related to Metro stations.

The public hearings that are held before final determination of station locations provide an opportunity for residents and businessmen in immediate proximity to any proposed station to participate in the evaluation of its impact.

A generalized summary of anticipated station impacts is presented in Part 2 of this study, Route Summaries and Critical Areas.

Traffic Analysis

Local traffic patterns are important to the precise location of a station and of station access points. Stations must be easily accessible to as many arterial and collector roads as possible and should not necessitate vehicular access through local residential streets.

Design of parking areas, drop-off and pick-up areas and park-and-wait areas for feeder buses and for automobiles is related to the volumes of access traffic arriving on adjacent roads and the directions from which such traffic arrives.

Mode of Arrival

The design of a station involves providing access for feeder buses, automobiles and pedestrians. Bicycle and motorcycle facilities have also been added to station plans.

Mode of arrival varies with distance from the center of the region. In downtown areas, most riders arrive by foot, while in suburban areas, most arrivals are by feeder bus or automobile. Access capacities for the various modes to be provided at each station are based upon mode of access projections prepared in the Net Income Analysis for the system and upon a policy of increasing access by means of bicycle as a means of improving air quality.

Feeder Systems

There are large wedges of the metropolitan area which do not receive immediate service by the rail lines, but nevertheless the whole area is served by the rail system through use of feeder buses and autos to bring people to the stations. The distance involved in riding a feeder bus or driving to the rail rapid transit station is small compared to the length of the overall journey to downtown. The feeder system is discussed at some length in Appendix D in Part 3 of this study.

Stations must be located at the convergence of major roads in order that the feeder system may operate effectively.

Type of Ownership

Because of the width of access points needed for stations, it is usually necessary to acquire private properties adjacent to the right-of-way to provide station access. Where local governments or merchants wish to build additional access points on their own property that meet WMATA specifications, they may do so and give these to WMATA.

Type of Station

Station design is determined largely on the basis of peak hour capacity, safety, compatibility with existing or proposed adjacent uses, functional type of station and location of the station right-of-way.

Functionally, there are two basic types of Metro stations, origin stations and destination stations. Origin stations are primarily bus-oriented and destination stations are primarily geared to pedestrians

Because of the location of the station right-of-way, some stations are deep, some are shallow and some are on the surface. Surface stations include stations that are in cut, stations that are at grade and stations that are elevated.

As indicated in Part 2, Route Summaries and Critical Areas, of this study, station construction frequently presents an opportunity for redesign of the immediately adjacent area.

Impacts of Stations

While the critical areas study in Part 2 of this report and the route environmental studies present an accounting of all significant station impacts anticipated at the present time, additional significant impacts may become apparent at the time of final design. Should such impacts become apparent, WMATA will prepare additional specific station studies to analyze and evaluate such impacts.

SECTION 5: THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The preceding sections of this Report have included an appraisal of beneficial and harmful, short-term and long-term impacts as well as alternatives studied to vary these for the Metro system. This section extends this appraisal into an overall analogy between local short-term uses of the human environment and long-term productivity. How the regional rapid transit system benefits the environment for future generations, in spite of disruptions ensuing from its construction, is the central question.

One area of concern that emerges from the appraisal of the regional Metro system is that of spoil disposal, including sedimentation and erosion. The amount of spoil produced by any one area in the system is small, but the collective volume is significant. The major impact created by spoils is primarily one of erosion and sedimentation. If soil erosion is extensive and not controlled during construction, the subsequent deposition of the sediment can have a negative and long-lasting effect on the flora and fauna of streams. The deposition of channel bars, bank erosion, obstruction to flow, and shifting configuration of the channel bottom of streams alters aquatic habitats. In streams, such as the Potomac River, where water quality and the aquatic environment has been degraded, steps to improve and reestablish healthy habitats free of sedimentation and turbid water should not be neglected. Each construction project which employs measures to control negative impacts is contributing beneficially to the improvement of environmental quality. WMATA has demonstrated its concern in this area through its contractual terms with contractors. Enforcement of these provisions should limit the short-term impacts and, thus, the long-term negative effects due to the construction process.

The physical transportation of spoils material coupled with the location of dumping sites may create both short-term and long-term impacts. Where sites are located in areas where they preempt other land uses, or where they can be reached only by local and secondary streets, the impacts are potentially negative. Disruptions caused by interference with local traffic and noise, though negative, are mainly short-term in nature. These problems can be

minimized by selecting suitable dumping areas. WMATA has written contractual agreements controlling the transportation of spoils by contractors. However, the regulation of dumping and site location has been dependent on local jurisdictional regulation, co-operation and enforcement.

In addition to the steps that WMATA can take in the form of contractual terms, site location, etc. toward the minimization of spoil problems, excavated spoil can be reused in a beneficial manner by creating new land. Long-term productivity of land created indirectly by Metro spoil is illustrated by an analogy with the Washington Mall, which was formed by land fill, some of which came from construction spoil. Although this process may preempt former land uses, it can also produce new land resources for long-term use.

Within the area that is to be serviced by Metro, a considerable diversity of vegetation occurs. Urban parklands, roadside strips and highway median vegetation, and areas of forest that are essentially natural in character will be impacted by Metro construction in the region. However, most of these disturbances will be short-term. Any loss of vegetation will be replaced wherever possible and in some instances, landscaping upon Metro completion should improve present conditions. Segments of the Metro routes do disrupt areas of essentially natural forest that serve as excellent wildlife habitat. These areas will suffer from Metro construction, operation, and particularly from station facilities. However, these natural uses must be balanced against the long-term productivity of the urban development around Metro operation and the station sites, which is anticipated to be one of the benefits of greatest significance. These natural uses also have to be balanced against the alternative uses of the same areas that are proposed in local comprehensive plans and zoning ordinances. In most cases, the alternative use proposed would be equally detrimental in the short-term.

The construction of any major project involves the short-term disruption of local facilities, such as sewers and paving, and Metro will be no exception to this. This disturbance is normally temporary and will be balanced by the improvements which ensue upon completion. The introduction of Metro into some areas will result in improved facilities, which might have otherwise been delayed. Although both a financial and inconvenience cost for the present, these facility improvements as well as the benefits of the Metro system will represent a capital investment in the future.

Future generations will benefit from the positive

impact that the Metro system is expected to have in the reduction of automobile traffic and congestion.

Short-term impacts will be moderate with local increases in pollution levels due to construction activities and traffic disruption. However, even these short-term adversities can be minimized by strict observance of the pollution control measures required by WMATA construction contracts and by local regulations. After the completion of Metro, the long-range picture is one of decreased air, water and noise pollution resulting from an increased use of the rapid transit system over the automobile.

A COG study of 1966 reports that automobile emissions are the major cause of air pollution in the metropolitan area. The high proportion of commuter travel that occurs in peak hours, particularly on weekdays, causes the slow moving traffic and idling cars that in turn produce the highest pollution levels. Metro, together with an improved regional bus system, should divert a significant number of automobile trips to other modes of travel. Furthermore, Metro is expected to lead to significant improvements in noise levels and water quality by reducing the amount of automobile contaminants (lead and other gasoline additives, engine exhaust, etc.) as well as the noises associated with automobile traffic.

Short-term construction disturbance, impacts upon recreational areas and vegetation, etc. will impinge upon the lives of those living and working along Metro routes. However, most of those impacts should, first of all, be temporary, if WMATA contract provisions are met; and secondly, the benefits accrued by the existence of a rapid transit system should outweigh these mostly short-term disadvantages.

With respect to socio-economic factors, the implications of Metro, both short-term and long-term, are good. The number of businesses, families and/or individuals relocated due to Metro construction is very low when compared with the scale of the project and with alternative systems. Because the Metro runs alongside existing railroad or highway rights-of-way wherever possible, it does not, for the most part, act as a divisive factor between neighborhoods. Community disruption is minimal; no communities are divided. Half of the system is in subway which makes it unobstrusive after completion.

All areas should benefit from the fast and comfortable means of service that Metro will offer. Metro will provide greater ease of movement into and out of downtown Washington and throughout the region. Transit will supply safe and inexpensive transportation for the young, aged and handicapped. It will expand educational opportunities by giving students

from a number of communities access to universities, technical colleges, primary and secondary schools in other areas. Residents and tourists in the region will be able to reach cultural and recreational activities without having to face traffic congestion and a shortage of parking facilities, two problems which are particularly compounded by tourist reliance on the automobile.

The Metro construction process will increase employment in the construction trades on a short-term basis, and for all employment in the region on a long-term level. The provision of a rapid transit system will aid access to jobs within the District. In addition, it will serve reverse haul commuters, making it much easier to commute to the suburban jobs where many of the employment opportunities are now located. This will be particularly true if a good feeder bus system is also implemented as planned in conjunction with Metro.

Washington is one of the fastest growing metropolitan areas in the country, and as such, like many other cities in the nation, it is experiencing a shift of the metropolitan population to the suburbs. Although Metro is not expected to have an impact on growth, itself, it is likely that it will have an effect on the distribution of population. Population growth trends should be accelerated in areas directly served by the system and areas without Metro will probably experience a somewhat lower growth rate. In this manner, Metro will have a controlling or shaping influence on the growth of the region. This is a particularly important principle in relation to private investment.

The construction of a fixed rail rapid transit system constitutes an investment of public capital from which the Washington region expects a return that more than balances the initial outlays. Metro provides pre-conditions helpful to future economic development. Investment in rapid transit also encourages private investment. The fixed rail transit not only increases investment, it also influences location, promoting orderly development. Metro will help implement the wedges and corridors policy. While low density suburban development will continue, Metro service along corridors will enhance the growth potential of these areas, and in terms of transit, will make the wedges comparatively less accessible to future growth.

Accompanying the growth in the suburbs is a decentralization of employment in Washington. It is expected that Metro will also have a balancing influence on this movement. Although it will increase access to the suburbs for the reverse haul commuter,

it will, likewise, improve accessibility to the downtown core. In this way, Metro can help the District to maintain its economic viability.

If Metro were not built, disbenefits corresponding to the discussed benefits would result. Without the Metro system as a shaping element for growth, the wedge and corridor development principle would be weakened so that the spread of development in the suburbs could continue unchecked. Accessibility to employment would be considerably less, increasing the chances for further decentralization of employment in Washington. Congestion and its resultant problems would continue and increase.

Metro can set an example for the rest of the nation. Although rapid transit systems are being constructed in several urban areas and these are far-reaching projects when measured against the rest of the nation's provisions for public transportation, the Metro system overtakes them in terms of regional coverage. It comes closest toward achieving the goal of a balanced highway and transit system to aid in growth-shaping; it results in increased employment accessibility; and it helps to curb congestion and related problems. These long-term benefits for future generations, accrued by the introduction of the Metro system, balance the short-term disruptive impacts of the construction process.

SECTION 6: IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

Since Metro is an extensive and costly undertaking, its construction and operation could be considered an irretrievable commitment of natural and fiscal resources. Land, money, manpower, construction materials and electric power could all be termed major irretrievable resources. The costs of using these resources for Metro, however, should be considered in relation to the benefits accruing from Metro service and the costs of not constructing a regional rapid transit system.

Metro is estimated to be a $4.454 billion construction project. It will purchase approximately $3.6 billion of structural and finish materials and services, $167 million worth of rapid transit vehicles, $240 million in rights-of-way, and $388 million in payroll and supporting materials for engineering and administration (escalated dollars).

Money to finance construction will be irrevocably committed. But it is thought that the long-term benefits of transit service will justify the expenditure. While a large share of financing the project will fall on this generation and the full benefits of Metro service will not be realized until the entire system is operating, economic benefits will be accrued over the short-run from both the direct investment in Metro construction and its multiplier effect on the economy. The precise extent of this effect is difficult to predict, although it has been estimated that the original investment may be doubled or tripled.

From a long-term monetary point of view, the success of the undertaking will depend on its revenue producing capabilities. As a public transportation system to serve the region's residents, its value will be assessed by its service and accessibility. Should the automobile continue in popularity and mass transportation not be acceptable to the majority of the public and not be self-supporting, the system could still be a public service with social benefits accruing from its operation for persons unable to drive or restricted to public transportation because of income, age or handicap. The commitment of monetary resources thus could be justified from a social point of view.

It is doubtful, however, that Metro will require justification entirely in social terms for a marginal financial outlook is foreseen. Projections indicate that in 1990 approximately 455,500,000 trips will be made on the combined rail and bus transit system.

*Second and fifth paragraphs revised

A preliminary study prepared for WMATA by Alan M. Voorhees and Louis T. Klauder indicated under fare system three, transit revenues may be expected to total $305,200,000 with operating and maintenance expenses of $285,000,000 leaving over $202,000,000 for depreciation and debt service.

METRO CAPITAL COSTS*

	Cost in Thousand Dollars		
	Base Year Costs	Escalation	Escalated Costs
Structural & Finish Construction	1,990,364	1,667,925	3,658,289
Rights-of-WAy	240,397	--	240,397
Vehicles	107,004	59,580	166,584
Engineering & Administration	259,699	128,748	388,447

*Excludes Facilities for the Handicapped and Jurisdictional Add-Ons.
Source: WMATA

While the costs of building and operating Metro may appear high, the costs of transporting the projected Metro redership by other means would be substantial. The 1959 Metropolitan Transportation Survey recommended that a $2.5 billion construction program with $2 billion for new limited access highways and $500 million for a transportation system be completed by 1980. The National Capital Transportation Agency evaluated this proposal and in 1962 found that a more balance transportation system with greater emphasis on transit could result in $367 million less than the cost of the auto-dominant transportation system recommended in the 1959 proposal. While these figures are out of date and current cost estimates are not available for the entire region, the relationship in comparable. A non-transit alternative to Metro would require a larger capital outlay to transport the same amount of people quickly and efficiently.

A substantial part of the Metro system is located in or along existing street, highway and railroad rights-of-way. Limited quantities of land presently devoted to non-transportation uses are also required for portions of Metro routes and station areas. Both the use of existing rights-of-way and the

*First paragraph and table revised

REVISED

acquisition of additional land represents a commitment of a resource which is becoming more scarce as the region grows.

In the case of existing rights-of-way, however, Metro will make multiple use of land rather than add to the land already committed to the region's transportation system. Such multiple use represents a substantial resource savings both in terms of land and money.

Land acquired outside of existing rights-of-way, and that which is impacted by the attendant development, is considered a resource to be regulated by local government for the benefit of the community at large. It is thought that converting some land to this transportation use will not only result in better transit service but will also have the overall effect of more efficient utilization of existing land resources in the region.

Concrete, lumber, steel and equipment used for Metro construction and operation represents a commitment of natural resources. Materials which are considered imminently scarce or rapidly depleting will be used in relatively insignificant quantities. Some of the materials are not considered scarce and some, such as lumber for decking and forms, are reusable and thus retrievable.

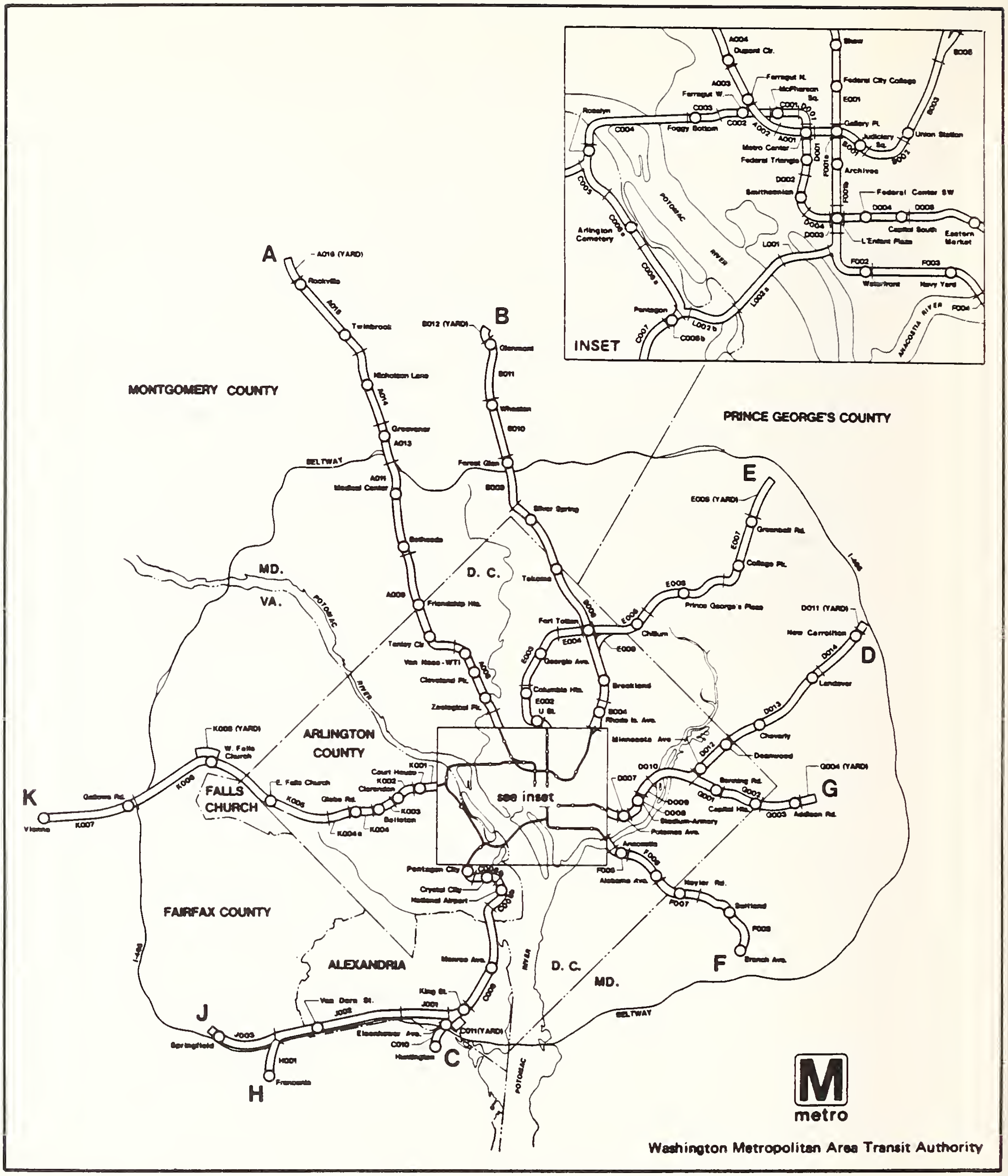
Labor expended in construction and operation will constitute an irretrievable commitment of human resources but aside from the benefits realized by the community at large from Metro and its attendant development, the workers involved will enjoy the benefits of their employment in terms of increased subsistence and enhanced life style.

In a project the size of Metro, some irreversible harm to scenic and natural resources can be expected. The major land uses traversed are highways or streets or rail rights-of-way. Crossing of parklands, waterways, wildlife sanctuaries, historic sites, and unspoiled open spaces has been held to a minimum. Continuous effort has been expended to find the least objectionable alignment with good engineering potential, compatible land uses, and citizen approval. There are problems with spoil disposal, erosion and sedimentation, and loss of vegetation during Metro construction, and some of these problems are not irreversible. However, should rapid transit decrease automobile usage, hold it at no greater than present levels, or slow its rate of increase, Metro will help prevent many of the irreversible effects that automobiles directly or indirectly, are having on scenic and natural resources.

Metro's system-wide electrical demand is estimated to total 1,354,334,423 kilowatt hours in 1981.

Most of this demand will fall on Pepco and Vepco and BG&E contributing considerably smaller shares. Metro's projected electrical demand comprises approximately 3.5% of the current combined generating capacity of the three power companies. Current estimates to 1980 indicate that Metro consumption will represent only about 1.7% of the total generating capacity. In general, the power companies arrive at future generating capacities by projecting past trends and calculating special increases in power demands. Metro is not considered to be a special increase in this regard. Pepco, for example, doubles its generating capacity approximately every eight years. Metro's power demands are considered within the normal expansion plans of both Pepco and Vepco; no special generating facilities are needed to accommodate Metro.

More important than the precise electrical demand of Metro is the shift it could represent from fossil fuels to electrical power. While Metro will increase the electrical power demands in a rapidly growing region, by diverting automobile users to transit, it will also help slow the rapid increase in fossil fuel consumption by automobiles. Most of Metro's new power demand is likely to be supplied by nuclear power plants with full water recirculation. The pollution associated with this form of nuclear energy will be of a different character and probably less than that which accompanies the use of fossil fuels. Likewise, the commitment of irretrievable resources will be less.



Engineering Segment

METRO ENGINEERING SEGMENTS

SECTION 7: AGENCY COMMENTS, A SUMMARY OF RESPONSES, AND INDEX TO LOCATION OF RESPONSES

Of the agencies and groups from which comments were requested upon the draft study, the following responded.* Copies of their letters are set out in the following pages. Each letter is followed by a summary of the responses made to its comments in this Report, and a description of the location within the Report of each response.

- National Capital Planning Commission
- Maryland National Capital Park and Planning Commission
- Northern Virginia Planning District Commission
- Advisory Council on Historic Preservation
- Virginia Department of Highways
- Metropolitan Washington Council of Governments
- Fairfax County Board of Supervisors
- Department of Agriculture, Soil Conservation Service
- Department of Defense, Army Corps of Engineers
- Department of Transportation, Federal Railroad Administration
- Department of the Interior, Facilities and Government Lands
- Department of the Interior, National Park Service
- Department of the Interior, Bureau of Sport Fisheries and Wildlife
- Department of the Interior, Office of Environmental Review
- Environmental Protection Agency, Office of Noise
- Environmental Protection Agency, Office of Federal Activities
- Save Takoma, Environmental Committee
- The Washington Ecology Center
- City of Falls Church

*The complete list of agencies to which copies of the draft Statement were sent is set out on pages x-xii of this Report.

NATIONAL CAPITAL PLANNING COMMISSION

WASHINGTON, D.C. 20576

IN REPLY REFER TO:

NCPC File No. 0222

APR 19 1973

Hon. Benjamin O. Davis, Jr.
Assistant Secretary for Environment,
Safety & Consumer Affairs
Department of Transportation
NASCES Building, Room 10101
Washington, D. C. 20590

Attention: Mr. Martin Convisser, Director
Office of Environmental Affairs

Dear Mr. Davis:

In accordance with your letter of February 27, 1973, requesting comments on the Draft Environmental Impact Statement for the Washington Metro System, a copy of the report of the Commission's Executive Director, as approved by the Commission on April 5, 1973, is enclosed.

Also enclosed for your information is a copy of a recent article from the Evening Star-News concerning the Commission's April 5th action, and a copy of a letter to the Editor clarifying the nature and scope of the Commission's comments on the Draft Environmental Impact Statement for the Metro System.

Sincerely yours,

Charles H. Conrad

Charles H. Conrad
Executive Director

Enclosures

NATIONAL CAPITAL PLANNING COMMISSION

WASHINGTON, D.C. 20576

NCPC File No. 0222

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY-REGIONAL RAIL RAPID TRANSIT PLAN AND PROGRAM - DRAFT ENVIRONMENTAL STATEMENT

Report of the Executive Director

April 5, 1973

The Executive Director recommends that the Commission report to the Secretary of Transportation on the Washington Metropolitan Area Transit Authority's Draft Environmental Statement on the Metro System in the National Capital Region, as follows:

1. The Draft Statement is consistent with Commission policies, as expressed in the Mass Transportation Plan element of the Comprehensive Plan for the National Capital.

2. The Draft Statement, "as a general appraisal of the entire Metro System" that "appraises the general impact of construction and operation of the Metro system . . ." is not an adequate description of environmental impact for Commission review of individual project segments, such as the platform location and access or final designs for individual Metro stations including the Archives and Potomac Avenue Stations pursuant to the Commission's environmental policies and procedures. Therefore, the Draft Statement is not itself sufficient to meet the Commission's submission requirements for review of individual proposed developments in the National Capital Region under Section 5 of the National Capital Planning Act of 1952, as amended.

3. The Authority should clarify the scope and content of the "more specific Environmental Impact Study of the C, D and L Routes" now being prepared by the consultant, and the degree to which this more detailed impact study will, or will not, provide the Commission with an adequate basis for its review of station plans and/or the specific alignment of three of the eight Metro routes within the Region.

The Executive Director also recomends that the Commission reiterate its request to the Washington Metropolitan Area Transit Authority that it submit, as a part of all future submissions under Section 5 of the National Capital Planning Act of 1952, as amended, a Description of Environmental Impact specifically related to the proposed development in accordance with the Commission's Environmental Policies and Procedures (36 Federal Register 23706, as amended) and the Commission's policy that a special effort be made in the National Capital Region at the seat of the Federal Government to implement the objectives and policies of the National Environmental Policy Act of 1969.

* * * *

Project Description

The Department of Transportation has transmitted a Draft Environmental Statement on the Metro System of the Washington Metropolitan Area Transit Authority with a request for comments. The Authority has also submitted a copy of the same Draft Statement in response to the Commission's request for environmental impact data on the final designs for the Archives and Potomac Avenue Stations.

The Draft Statement describes the effects of the construction and operation of the Metro system on air, noise and water quality both from the standpoint of construction and operation of the facilities and from the standpoint of the systems effect on travel and development distribution in the Region. A great amount of detail is given to the impact of construction on park and public and historic structures. Short term social and economic impacts are discussed in relation to long term effects on character and distribution of development.

Unavoidable adverse impacts are described as dirt, noise and traffic disruption during construction as well as the displacement of 584 businesses and 874 families. There will be losses of mature trees and permanent effects on some small areas of park land where aerial structures cross.

Alternatives described are plan and system alternatives which were considered in arriving at the plan currently under construction.

The relationship between short term use of the environment and long term maintenance and enhancement of productivity is described as the consumption of materials, the displacement and nuisance caused by construction versus the eventual utility of the transportation service the system will provide.

Irreversible and irretrievable resource commitments are described as money, labor, construction materials and power. Not all are irretrievable, however, since the transportation service provided will reduce the costs for other systems, and will foster some compensating economic benefits to the community.

Project Evaluation

The Commission recognizes that the Draft Statement is intended to cover the entire system on a regional scale. The system it describes is consistent with the Mass Transportation Plan element of the Comprehensive Plan as adopted by the Commission and subsequently amended.

The Draft Statement, "as a general appraisal of the entire Metro System" that "appraises the general impact of construction and operation of the Metro system upon the natural and man-made environment in broad ecological, socio-economic and visual terms" is, however, inadequate as a basis for Commission review of projects submitted by the Authority upon which the Commission must, in accordance with its environmental policies and procedures, find that the proposal is consistent with the objectives of Section 101 of the National Environmental Policy Act of 1969 and will not adversely affect the quality of the environment in the National Capital Region.

The Authority has also submitted the Draft Statement in response to the Commission's request for specific environmental impact data relating to project designs under review by the Commission. The principal matters of environmental impact which have been the Commission's concern while reviewing Metro designs and which do not appear to be addressed in sufficient detail in the Draft Statement, are air conditioning and ventilation facilities for stations, the operation of vehicular facilities, particularly buses, at some stations, and the effects of surface or elevated structures on open park lands and river crossings. The requirements for form and content of both Environmental Statements and Descriptions of Environmental Impact require a discussion of alternatives considered for such designs.

The need for additional environmental data in support of project submissions is indicated, for purposes of illustration, in the following sections of the Draft Statement:

a) Section 2: The Probable Impact of the Proposed Action on the Environment. (As supplemented by the contents of the section "Route Summaries")

The discussion on air quality and noise and vibration deals largely with system scale and train operation versus other modes. In order to deal with specific facilities and their design, the Commission must have specific information on the effect on air quality and noise by air conditioning and vent structures and their operation in their immediate environment as well as train and other vehicular operation in the vicinity of stations or open structures.

b) Section 4: Alternatives to the Proposed Action

Dealing with a regional scale, this section covers alternative system plans including alternate routings and/or modes. This is a history of the evolution of the current plan. It contains nothing with respect to alternatives of design of equipment or location of stations and facilities to be built to carry out the plan. In order to perform project design review, the Commission must have an assessment of specific alternatives to the design presented.

On the basis of the above, the Executive Director believes that the Commission should reiterate its previous request to the Authority that it provide a Description of Environmental Impact, in accordance with the Commission's environmental policies and procedures, and in conjunction with future submissions to the Commission.

In addition to the above, the following comments on the Draft Statement are offered for consideration in the preparation of the Final Environmental Statement:

a. Preface

On page i of the Draft Statement, it is stated that "more detailed information on a route basis, including segment maps with recorded impact estimates, provides more site specific information to supplement the Statement, and is available from WMATA upon request."

Presumably, this data and information could be used by the Authority as the basis for preparing Description of Environmental Impact for submission to the Commission in conjunction with future submissions of project plans.

b. Summary

On page vi of the Draft Statement, under 3. Summary of Environmental Impact and Adverse Environmental Effects, it is stated that:

> "The major impacts of the Metro system are largely independent of specific locations of route alignments, deriving instead from the creation of the regional system. Impacts vary in character and magnitude locally, but regional impacts are assumed to be the major concern of this summary."

The major impacts of the Metro system are largely areawide or regional in nature. However, the impacts resulting from the construction and operation of segments of the Metro can have, relatively speaking, a major local impact around proposed Metro stations in terms of land acquisition, displacement, or other impacts on adjacent land uses or on the character and quality of the environment in the immediate area.

c. Purpose of the Appraisal

On page 3 of the Draft Statement, it is indicated that the Authority's consultant is doing "a more specific Environmental Impact Study of the C, D and L Routes." The extent to which this Route Study on three of the eight Metro lines will, or will not, be adequate for Commission's review of the plans for stations along these Routes is not known at this time. The Authority should be asked to clarify this matter at an early date.

NATIONAL CAPITAL PLANNING COMMISSION

WASHINGTON, D.C. 20576

APR 12 1973

The Editor
Evening Star-News
225 Virginia Avenue, S.E.
Washington, D.C. 20003

Dear Sir:

The news article by Thomas Crosby which appeared in the April 6 Star is a misleading account of the Planning Commission's action on April 5 with regard to the "Washington Metropolitan Area Transit Authority - Regional Rail Rapid Transit Plan and Program - Draft Environmental Statement." Mr. Crosby begins his article by saying that "The National Capital Planning Commission has criticized as 'not adequate' a draft environmental statement prepared by Metro on subway construction and operation." This is a confusing statement.

The Commission took action on two submissions, the first of which was a Draft Environmental Statement on the Metro System submitted by the Department of Transportation. With regard to this submission the Commission stated: "The Draft Statement is consistent with Commission policies, as expressed in the Mass Transportation Plan element of the Comprehensive Plan for the National Capital." In other words, the Commission found this submission to be adequate as a general appraisal of the entire Metro System.

The second submission was made by the Transit Authority in response to the Commission's request for environmental impact data on the final designs for the Archives and Potomac Avenue Stations. In response to this request the Authority submitted a copy of the same Department of Transportation Draft Environmental Statement on the Metro System. The Commission found that this Draft Statement on the entire system "is not an adequate description of environmental impact for Commission review of individual project segments, such as the platform location and access or final designs for individual Metro Stations." The Commission therefore requested that the Authority submit additional data and information on the environmental impact of its individual project segments.

Unfortunately, Mr. Crosby's article failed to distinguish between the two submissions and the Commission's comments with respect to each.

Sincerely yours,

Charles H. Conrad
Executive Director

STAR
SUBWAY
4-6/73

Metro Study Hit On Area Impact

By THOMAS CROSBY

The National Capital Planning Commis-sion has criticized as "not adequate" a draft environmental statement pré pared by Metro on subway construction and operation.

The commission yesterday said Metro's nearly 300-page draft statement "is not itself sufficient ... for review of (the environmental impact) of individual proposed (Metro projects)."

A spokesman for the U.S. Department of Transportation, whichsought comment on the statement from 70 area agencies, said the commission's report is "the first adverse comment we've received."

The commission eport, which was adopted unamiously and prepared by the commission's executive director, Charles H. Conrad, said Metro does not describe the effects the elevated portion of the rapid rail system will have on "open parklands and river crossings."

IT ALSO SAYS there is not enough detail concerning air conditioning and ventilation facilities — some of which may eventually take up as much as one-fourth of a city block.

A Metro spokesman said the agency "will respond to these comments" and that the purpose of the draft statement "was to get a reaction."

The commission said it has requested in the past that Metro provide "more specific environmental impact" studies of proposed subway routes and stations so that the commission can determine if the "Objectivers and policies of the National Environmental Policy Act of 1969" are being met.

Another criticism is that Metro has failed to evaluate the impact the subway may have on a locality in terms of "land acquisition, displacement .. or on the character and quality of the environment in the immediate area." Metro said the major impact of the systems would be regional and the statement did not examine local impact.

THE COMMISSION also pointed out Metro's statement does not contain any available alternatives with respect ot the design of equipment, the location of Metro stations or route alignments.

One commission member, Edmund W. Dreyfus, said even if Metro submitted the necessary information, "Frankly, I don't have the time to read through these (type of) reports."

But Charles C. Johnson Jr., another commission member, said the commission "has a responsibility" to get this information before ap proving Metro projects.

The Department of Transportation, which expects to receive all comments on Metro's statement by April 15, will ask Metro for comment before sending a final Metro environmental report to be filed with the Council on Envi ronmental Quality

RESPONSE TO COMMENTS OF THE
NATIONAL CAPITAL PLANNING COMMISSION (keyed to pages and paragraphs of letter)

1. Availability of C, D and L Routes Environmental Statement and other Route Studies from WMATA, designed to provide additional detail in evaluating impacts (pg.1,paras.2,3,4; pg.3, paras. 5 and 6)

Copies of the Environmental Impact Study of the C, D and L Routes have been completed and are available for review. This study and subsequent Route Environmental Statements are designed to evaluate impacts at a level of detail sufficient to meet the Commission's submission requirements for review of individual proposed developments in the National Capital Region under Section 5 of the National Capital Planning Act of 1952, as amended, and are prepared in accordance with the National Capital Planning Commission's Environmental Policies and Procedures (36 Federal Register 23706, as amended) is included in this report in Section 2. Complete reports are available for review from WMATA.

2. Additional detail concerning auxiliary equipment, impacts of Metro construction and operation, and station locations, and areas of potential local critical concern (pg.2,paras. 8,9,10,11,12,13, and 14)

A discussion has been included in this report of WMATA design standards for auxiliary equipment including air conditioning and ventilation facilities. That discussion and a discussion of the feeder bus system are presented in Part III, Appendix H of this Study, Metro System characteristics. Detailed evaluations of the air quality impact of buses and other automotive vehicles at stations, and of air conditioning and vent structures are presented in Route Environmental Studies available from WMATA. Regional air quality impacts are discussed in Part III of this Report in Appendix H, the Air Quality Study.

More detailed evaluations of the impacts of such auxiliary facilities, of the affects of surface and elevated structures on open parklands and river crossings and of alternatives of location or design of equipment and stations and facilities to be built to carry out the plan are presented in individual Route Environmental Statements, available for review from WMATA.

Areas in which such local impacts might be of critical concern are identified on a route by route basis in Part II of this study, Route Summaries and Critical Areas Identification. A comment to that effect has been added to page i of this study.

Those impacts resulting from the construction and operation of segments of the Metro that can have a major local impact around proposed Metro stations, in terms of land acquisition, displacement and other impacts on adjacent land uses or on the character and quality of the environment in the immediate area are discussed in individual Route Environmental Statements. A comment to that effect has been added to page vi, of this study, under 3, Summary of Environmental Impact and Adverse Environmental Effects. In addition, Part II, Section 2 of the Study identifies such areas as part of an identification of major potential areas of critical local impacts.

THE MARYLAND - NATIONAL CAPITAL PARK AND PLANNING COMMISSION
REGIONAL AND METROPOLITAN DISTRICTS IN MONTGOMERY AND PRINCE GEORGE'S COUNTIES, MARYLAND

Regional Headquarters Building
8787 Georgia Avenue
Silver Spring, Maryland 20907

589-1480
Area Code 301

April 10, 1973

Mr. Martin Convisser,
Director
Office of Environmental Affairs
Office of the Secretary of Transportation
400 7th Street SW
Washington, DC 20590

Subject: Draft Environmental Statement for the Regional Metro System, prepared by WMATA in cooperation with US Dept. of Transportation

Dear Mr. Convisser:

Embodied herein, are this agency's comments relative to the subject environmental statement. These comments are only directed toward those Metro routes which will be located in Montgomery and Prince George's Counties (i.e., Routes A, B, D, E, F and G).

In general, it is necessary to note that the Statement is disappointingly vague. It makes frequent reference to provisions in WMATA contracts that require environmentally protective measures to be taken, but provides no evaluation of compliance, nor discusses the extent to which compliance succeeds in protecting the environment. It also tends to understate and de-emphasize negative impacts and to dwell upon potential long-range benefits expected to accrue to the region through traffic diversion to Metro Rail from automobiles. Some of the Statement's shortcomings in depth are made up by its breadth; it does indeed, at least touch upon virtually every item of significance in the system except passenger safety and security.

The primary general conclusion reached by the Consultant is that the major impacts of the system are regional rather than local. While the overall impact on air, water, and noise pollution is expected to be positive, it is acknowledged (but not quantified) that local concentrations of auto emissions could result at station locations, particularly where substantial auto arrivals are expected. Spoils (18 million cubic yards are projected) form the second major impact item. Sixty percent of the spoils are projected for use as backfill, but the remainder need to be disposed of. Clearance, noise, and short-term impact of construction is felt by the Consultant to be minor.

The Statement contains an excellent review of prior transportation systems plans developed for the Washington area by National Capital Transportation Agency and other pre-WMATA agencies, and provides a valuable comparison of them.

The Statement, also, is oriented primarily to the District of Columbia in its focus and concern, and suggests that primary benefits accrue to the District, while benefits to the suburban jurisdictions are of a secondary nature. (A description of total dollar-term benefits to users, generally for time saved in travel, is interesting though the back-up documentation to support the very large dollar amounts presented is absent.)

Considerable emphasis is placed upon new development induced by the transit system. In both Montgomery and Prince George's Counties, the transit station impact areas are now under study in an effort to determine the best "mix" and density of new development. This Commission can not be positive, at this time, as to the new development that will be induced by the Metro, but it is positive that any new development will be in accordance with the development policies, plans and programs for the two Counties.

An appraisal report of environmental impact which does not, as is the instant case, address itself in a substantive way to the alternatives that could possibly alleviate the identifiable long-range, negative impacts of the proposed action upon floodplains, vegetative cover, wildlife, ecological systems, community structure, existing streams and park lands, does not comply, in the Commission's opinion, with the intent and spirit of the National Environmental Policy Act of 1969. The report implies that the predicted overall regional benefits of the ARS will justify the inevitable negative ecological, environmental, physical, and social impacts. This implication is documented in the

content of the report which merely identifies these negative impacts and then proceeds to completely ignore them by not offering alternative solutions. In most instances, the report does not even acknowledge that solutions should be sought. We think that such neglect has been outdated by the NEP Act and by the current public consciousness for, and attitude toward, environmental values.

In this regard, reference is made to the negative impacts identified in the subject report for the Greenbelt, New Carrollton, Branch Avenue and Addison Routes in Maryland. As in the case of the New Carrollton Route (see attached copy of statement by Mr. Philip Hogue), the consultant's report perpetuates these past and present lack of efforts to resolve the long-range negative ecological, environmental, physical and social impacts which are of major concern to the Counties.

In addition to those concerns expressed in Mr. Hogue's statement on the New Carrollton Route, this agency has major concerns regarding the identified impact the construction of the Greenbelt line (pages 201-8) will have upon the parkland, floodplains, stream channels, vegetative cover and the community structure as the line traverses the area from Chillum Road to Greenbelt Road. The subject report assumes that this line will share a common right-of-way with I-95. Current decisions by the Maryland Department of Transportation have eliminated this possibility and therefore, location of the Greenbelt line is considered to be flexible. It is suggested that WMATA take the advantage afforded by this flexibility and conduct a locational study designed to minimize the negative environmental impact.

In conclusion, the subject report appraising the environmental impact of the Metro system is valuable as a "problem identifier," but it fails to offer alternative solutions that would eliminate or alleviate negative environmental impact. The preparation of a comprehensive Environmental Impact Statement based on this appraisal is urgently recommended. Toward this end, this Commission offers its cooperation and assistance to WMATA.

Sincerely yours

Royce Hanson

Royce Hanson
Chairman

RH:rt
Encl.

STATEMENT OF:

Philip R. Hogue, Chairman, Prince George's County Planning Board

BEFORE:

Department of Water Resources Hearing on
WMATA's Proposed Cheverly and Landover Stations

JANUARY 26, 1973

Gentlemen:

We want to thank the Department for this opportunity to advise it prior to taking permit action on the Landover and Cheverly stations. Our first advice is to take no action on these two stations until the Department has the data and proposal re the New Carrollton Station in hand. The treatment of the New Carrollton Transit line should be considered as a single project, because both the line and the drainage area are part of a common system. Solutions forthcoming regarding drainage in New Carrollton could affect the problems downstream, and it may be that solutions for Landover are effected at New Carrollton.

In the vicinity of the Landover Station, the proposed fill in the 50-year floodplain amounts to a loss of 673,000 cubic feet of storage. The designers provided a compensatory storage of 740,000 cubic feet. But despite the fact that more storage capacity was provided than was destroyed, the 50-year floodplain level is still raised by 0.55 feet, approximately.

At the Cheverly station a storage capacity of 726,000 cubic feet was provided in contrast to 897,000 cubic feet displaced by parking lots and access roads. However, the water level is not affected here. Ordinarily, the increase in flood level of 0.55 feet would not be significant. However, the method used by the designers to check the variations in flood level elevation is questionable. A preferred approach would have been to take Beaverdam watershed from its divide above New Carrollton station to below Cheverly station as a system and investigate the effects on it of activities of the three stations. Why this approach was not taken is not exactly clear and may be a useful question.

We also advise that the flow rate of storms of less than 50-year frequency be taken into account.

The storage provided, by virtue of its location, will do nothing to control the flow rate of more frequent storms. In other words, the increase surface runoff from these storms due to the alteration of land use is uncontrolled. The amount of on-site detention that would be required, in accordance with the proposed State criteria, is about 33,000 cubic feet for the Landover station and 32,000 cubic feet for the Cheverly station.

We would hope that if the line construction is viewed as a total system and if runoff from storms of less than 50 years frequency are taken into consideration, solutions may be devised which are not apparent from the limited perspective now under discussion.

Thank you

RESPONSE TO COMMENTS OF THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION (keyed to pages and paragraphs of letter)

1. Scope and Detail of Studies (page 1, paragraph 2)

The level of detail in this study is such as to permit an evaluation of region-wide impacts of the proposed Metro system. Part II of this study, Route Summaries and Critical Areas Identification, identifies the location of areas that can be expected to be of critical local concern. These local impacts are to be evaluated in considerable detail in Route Environmental Studies, available from WMATA.

2. Passenger Safety and Security (page 1, paragraph 2)

Section 1 of this study as revised includes a discussion on passenger safety and security under Metro System Characteristics. Part III, Appendix D provides additional detail.

3. Local Air, Water and Noise Pollution Impacts (page 2, para. 1)

Part II of this study, Route Summaries and Critical Areas Identification, identifies the location of areas in which local air, water and noise pollution impacts can be anticipated. Appendix H of this study, the Air Quality Study, touches upon these local impacts and presents a model for evaluating air quality impact on a station-by-station basis. Detailed analyses of these impacts are presented in Route Environmental Studies.

4. Spoils (page 2, paragraph 1)

Spoils sites are discussed and analyzed in Appendix C of Part III of this Study; a summary of this analysis is presented in Part I under Natural and Ecological Impacts in revised Section 2 of this Study.

5. Dollar Benefits to Users (page 2, paragraph 3)

The brief analysis of dollar benefits to users under Traffic and Parking in the Socio-Economic and Cultural Impacts subsection of Section 2 of this study has been expanded to present in more detail the basis for the figures presented.

6. Transit Station Impacts (page 2, paragraph 4)

The findings of drafts of station impact studies currently in preparation throughout the region have been taken into account in this Study in Part II, Route Summaries and Critical Area Identification and have been referred to in some detail in the Route Environmental Studies available from WMATA.

7. Solutions and Mitigating Actions for Adverse Impacts (pages 2 and 3, paragraph 5 and final paragraph)

Section 3 of Part I of this Study as revised, Any Probable Adverse Environmental Impacts which Cannot be Avoided includes a discussion of mitigating actions to be taken to minimize adverse impacts. Such actions are discussed in more detail in the Route Environmental Studies available from WMATA. One conclusion of this Study is that many adverse impacts of the regional system could be minimized by means of enforcement of local codes and ordinances.

Appendix F in Part III of this Study presents a list and description of local codes and ordinances that govern development in the region.

The subsection of Section 4, entitled Considerations in Arriving at the Present System has been expanded somewhat to describe in more detail the criteria used in evaluating the alternative route proposals and station locations for the proposed system. Specific variations in alignment and station location that might alleviate long-term negative impacts are presented in the Route Environmental Studies.

8. Location of the Greenbelt Line, E Route (pg.3,paras. 2 and 3)

Alternative alignments for the Greenbelt Line or E Route are being studied in a series of Route Environmental Studies now underway. As these studies are completed, they are made available by WMATA for review.

9. More Detailed Treatment of the New Carrollton Transit Line (page 3, paragraphs 2 and 3)

Considerably more detailed study of the New Carrollton Transit Line than is presented in this, the regional statement is presented in the Environmental Impact Statement and Study of Routes C, D and L, available for review from WMATA.

10. Floodplains and Watersheds (page 4)

Appendix C in Part III of this Study presents a study of the region's watershed systems, as they relate to the regional mass transit system. Route Environmental Studies, available from WMATA, examines this relationship in detail.

Northern Virginia Planning District Commission

7309 Arlington Blvd. • Falls Church, Virginia 22042 • 703-573-2210

May 1, 1973

Mr. Martin Convisser, Director
Office of Environmental Affairs
Department of Transportation
Washington, D. C.

Dear Mr. Convisser:

The Northern Virginia Planning District Commission appreciates the opportunity to review the Draft Environmental Impact Statement on the environmental effects of METRO.

Based upon a review of the Draft Impact Statement it was determined that the statement is broad in nature and does not provide the necessary information to determine specific levels of environmental impact. Additional detail is needed in many areas to back up your claim that there will be a minimal impact as a result of METRO construction and operation.

We recommend that the following questions be more fully addressed in your Final EIS:

The reliance on local ordinances and enforcement of spoils disposal could prove to be an ineffective method of controlling sedimentation. The Final EIS should discuss the adequacy of local sediment ordinances in controlling spoils disposal and construction. Flood plain protection will differ from jurisdiction to jurisdiction. The Final EIS should compare Northern Virginia protective measures to others in the metropolitan area such as those embodied in the Maryland Wetlands Law.

The bulk of the environmental impacts in Northern Virginia will occur in the Cameron Run Watershed. This watershed is characterized by wide flood plains, excessive slopes and a large quantity of marine clays (that are subject to slippage) found on the slopes. These occur in the vicinity of the Huntington and Franconia stations. Great care should be taken to minimize the potential impacts that could result from the combination of these limitations. The Final EIS should address the areas containing these constraints and construction methods to be used to reduce the potential impacts.

Further investigation and information is needed in the Final EIS to identify:

1. The types and/or quality of woodlands lost, including wildlife species affected;

2. The noise levels expected from the METRO lines and station location, illustrating dBA levels and their location;

3. The actual visual impacts of station locations to the surrounding area including detailed site plans and elevations;

4. The effects of METRO at terminal stations (i.e. Vienna, etc.);

5. The potential impact of METRO stations on a corridor basis;

6. The overall impact of the regional rapid rail system on the metropolitan area as a whole;

Copies of this letter have been sent to the state clearinghouse to inform them of our review. Your cooperation in the intergovernmental review process is appreciated.

Sincerely yours,

John W. Epling
Executive Director

JWE:ASL:ew

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

JA

May 1, 1973

Mr. Martin Convisser
Director
Office of Environmental Affairs
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

Re: Metro, Washington, D.C.

Dear Mr. Convisser:

We have reviewed the draft environmental impact statement (EIS) for the Metro regional passenger rail system. Our comments below constitute all aspects of our review with the exception of noise quality. An EPA noise consultant is currently reviewing the draft statement: we will submit these additional comments shortly.

The Washington Metropolitan Area Transit Authority (WMATA) wisely chose to focus this draft statement on the long-term, systemwide impact of Metro on the region. In our view, WMATA and its consultants are to be congratulated for the untypically comprehensive and honest nature of its assessment. The general endorsement we lend to Metro and the draft EIS, however, should not preclude the circulation of additional impact statements for specific sections of the system or for other analyses required in support of State Implementation Plans for the National Capital Interstate Air Quality Control Region (under Section 110 of the Clean Air Act of 1970). Subject to revision with the conclusion of our noise review, we have reported this review in EPA réference category LO-2 ("LO" indicates our general lack of objections to the proposed action, as described in the EIS; "2" means that certain additional information, discussed below, is required for a more thorough assessment). The date and classification of EPA's comments will be published in the Federal Register in accordance with our responsibility, under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions.

General Comments

The construction and operation of Metro promises to have a great impact on the national capital area -- both in reorienting regional passenger travel and in determining centers of future development. Undoubtedly, analytical methods used with varying success to forecast changes caused by regional highway networks may not prove very accurate when applied to a project of Metro's scale. With this in mind, EPA's review of the system-wide impact statement focussed on general trends rather than on the specific numbers we look for in urban highway impact statements.

Metro is expected to support radial development corridors as set forth in the Policies Plan for the Year 2000, adopted in 1961. Because we feel that the principal impact of the system will be on regional development patterns -- in establishing and reinforcing the externalities and interdependencies which guide land use decisions -- we think the final statement should discuss this issue in greater detail. While it is true that WMATA is limited in its authority to affect land use beyond its right of way, its influence, along with the Metropolitan Washington Council of Governments (COG), may prove greater than COG's has been alone. We understand that COG is now reexamining the Year 2000 Policies Plan in light of what has occurred since its adoption: the final statement should therefore respond to any conclusions reached by COG regarding the current corridors and wedges scheme.

Station location has a large potential for both positive and negative impact. At one extreme, congestion and objectionable emissions may result where many vehicles from freeways converge at a station surrounded by low capacity streets, especially in residential areas; this situation should be avoided through parking capacities and providing freeway traffic direct access to stations relatively isolated from residential areas. On the positive side, stations located on development corridors provide opportunities for new growth centers. A corollary advantage in such situations is that a more balanced ridership is established by increasing the two-way flow during peak hours. The final statement should thus discuss station location as it relates to such impacts and evaluate selected stations for them.

Air Quality

The air quality effects of Metro must be viewed both regionally and locally. Regionally, the estimated reduction in total vehicle-miles of travel (VMT) will reduce total emissions significantly. Current studies by the National Capital Interstate Air Quality Planning Committee indicate that the attainment of national air quality standards requires a 53 percent reduction in Hydrocarbons and a 37 percent reduction in Carbon Monoxide emissions, both contributed largely by automobiles. Because Metro service will be rather limited in 1975, when the primary standards are to be achieved (under the Clean Air Act), the final statement should provide estimates on an annual basis of VMT, average speeds, and emission reductions for 1975 through 1980: these are expected to be the critical years, during which vehicular emission control devices will become increasingly more effective and widespread.

On a local basis, Metro operation will directly affect traffic patterns and indirectly affect regional development, thus redistributing emissions throughout the region (hopefully away from the D.C. urban core). Because the air quality standards must be maintained indefinitely beyond 1975, the distributional effects of so-called complex sources (e.g., parking areas, transit centers, new traffic generators, induced need for extra electric generating capacity) will be analyzed. Accordingly, vehicular emissions of those major complex sources (related to Metro) where standards problems are expected should be analyzed for HC and CO with respect to cold start, hot soak and idling conditions. Basic data and equations for determining such emissions, under current and future engine configurations, can be obtained from COG's Environmental and Health Programs.

Concerning Metro's energy demand (pages 157-158) it is frequently more useful to estimate the system's peak demand rather than the total annual demand. Incidentally, the unit of annual demand should be kilowatt-hours.

Water Quality and Wastewater Treatment

The direct effect of Metro on water quality involves sedimentation, hydrologic changes and roadway runoff. From the information provided, it appears likely that, if state and local regulatory controls are vigorously enforced, long-term water quality degradation can be minimized. More importantly, however, construction and operation of Metro will be less harmful than would highways of similar total capacity.

Our greater concern involves the changes in population and industrial distributions that may be brought about (in part) by Metro but not properly anticipated by wastewater treatment planning and construction. Provision of such facilities to serve the eventual development which will occur along the transit corridors may be very expensive, requiring basic changes in the regional plan. The final statement should discuss this potential problem, to include evaluations made by COG, the Washington Suburban Sanitary Commission, and the Virginia Water Pollution Control Board.

Spoils Disposal and Water Quality

Of the 18 million cubic yards of spoils expected throughout the construction period, 8 million will be in excess of the project's fill needs. The final statement should discuss in considerably greater detail the proposal to use the 300-acre Smoot's Cove, on the Potomac, South of the Wilson Bridge. The statement (page 39) that "(f)ill would not harm any natural habitat (but) would simply return the shoreline to its former location" is not supported by fact. Filling 300 acres, despite the previous existence of land decades ago, is not insignificant. In addition to State approval, the contractor must obtain a Department of the Army Permit. At that point, we will review the permit application to determine if it conforms with EPA's policy on protection of wetlands (a copy of which is enclosed).

The final statement should also discuss the dredging necessary for the three major crossings of the Potomac and Anacostia Rivers. Such dredging will produce turbidities which may adversely affect downstream fish and benthic organisms, in addition to the generation of spoils probably laden with toxic materials. Fill is also proposed to prepare flood prone lands for development. The effects of this fill on potential development within floodplains should be evaluated and a discussion of the hydrologic effects on adjacent streams should be included.

Finally, the draft statement does not consider the disposal of demolition debris. We suggest that: (1) sound buildings be relocated, when possible, and (2) care be taken whenever wood products are buried to prevent underground fires through adequate cover and compaction.

We were very pleased to review Metro's draft impact statement; if our expressed concerns are adequately resolved in the final statement, we feel that the unavoidable negative impacts of so large a transportation system can be satisfactorily minimized. If we may be of further assistance prior to circulation of the final statement, please don't hesitate to contact this office.

Sincerely yours,

Robert J. Blanco

Robert J. Blanco, P.E.
Chief
Environmental Impact Branch

Enclosure

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 21 1973

OFFICE OF THE ADMINISTRATOR

ADMINISTRATOR'S DECISION STATEMENT NO. 4

SUBJECT: EPA POLICY TO PROTECT THE NATION'S WETLANDS

PURPOSE. The purpose of this statement is to establish EPA policy to preserve the wetland ecosystems and to protect them from destruction through waste water or non-point source discharges and their treatment or control or the development and construction of waste water treatment facilities or by other physical, chemical, or biological means.

THE WETLAND RESOURCE.

a. Wetlands represent an ecosystem of unique and major importance to the citizens of this Nation and, as a result, they require extraordinary protection. Comparable destructive forces would be expected to inflict more lasting damage to them than to other ecosystems. Through this policy statement, EPA establishes appropriate safeguards for the preservation and protection of the wetland resource.

b. The Nation's wetlands, including marshes, swamps, bogs, and other low-lying areas, which during some period of the year will be covered in part by natural non-flood waters, are a unique, valuable, irreplaceable water resource. They serve as a habitat for important fur-bearing mammals, many species of fish, and waterfowl. Such areas moderate extremes in water flow, aid in the natural purification of water, and maintain and recharge the groundwater resource. They are the nursery areas for a great number of wildlife and aquatic species and serve at times as the source of valuable harvestable timber. They are unique recreational areas, high in aesthetic value, that contain delicate and irreplaceable specimens of fauna and flora and support fishing, as well as wildfowl and other hunting.

c. Fresh-water wetlands support the adjacent or downstream aquatic ecosystem in addition to the complex web of life that has developed within the wetland environment. The relationship of the fresh-water wetland to the subsurface environment is symbiotic, intricate, and fragile. In the tidal wetland areas the tides tend to redistribute the nutrients and sediments throughout the tidal marsh and these in turn form a substrate for the life supported by the tidal marsh. These marshes produce large quantities of plant life that are the source of much of the organic matter consumed by shellfish and other aquatic life in associated estuaries.

d. Protection of wetland areas requires the proper placement and management of any construction activities and controls of non-point sources to prevent disturbing significantly the terrain and impairing the quality of the wetland area. Alteration in quantity or quality of the natural flow of water, which nourishes the ecosystem, should be minimized. The addition of harmful waste waters or nutrients contained in such waters should be kept below a level that will alter the natural, physical, chemical, or biological integrity of the wetland area and that will insure no significant increase in nuisance organisms through biostimulation.

POLICY.

a. In its decision processes, it shall be the Agency's policy to give particular cognizance and consideration to any proposal that has the potential to damage wetlands, to recognize the irreplaceable value and man's dependence on them to maintain an environment acceptable to society, and to preserve and protect them from damaging misuses.

b. It shall be the Agency's policy to minimize alterations in the quantity or quality of the natural flow of water that nourishes wetlands and to protect wetlands from adverse dredging or filling practices, solid waste management practices, siltation or the addition of pesticides, salts, or toxic materials arising from non-point source wastes and through construction activities, and to prevent violation of applicable water quality standards from such environmental insults.

c. In compliance with the National Environmental Policy Act of 1969, it shall be the policy of this Agency not to grant Federal funds for the construction of municipal waste water treatment facilities or other waste-treatment-associated appurtenances which may interfere with the existing wetland ecosystem except where no other alternative of lesser environmental damage is found to be feasible. In the application for such Federal funds where there is reason to believe that wetlands will be damaged, an assessment will be requested from the applicant that delineates the various alternatives that have been investigated for the control or treatment of the waste water, including the reasons for rejecting those alternatives not used. A cost-benefit appraisal should be included where appropriate.

d. To promote the most environmentally protective measures, it shall be the EPA policy to advise those applicants who install waste treatment facilities under a Federal grant program or as a result of a Federal permit that the selection of the most environmentally protective alternative should be made. The Department of the Interior will be consulted to aid in the determination of the probable impact of the pollution abatement program on the pertinent fish and wildlife resources of wetlands. In the event of projected significant adverse environmental

impact, a public hearing on the wetlands issue may be held to aid in the selection of the most appropriate action, and EPA may recommend against the issuance of a Section 10 Corps of Engineers permit.

IMPLEMENTATION. EPA will apply this policy to the extent of its authorities in conducting all program activities, including regulatory activities, research, development and demonstration, technical assistance, control of pollution from Federal institutions, and the administration of the construction and demonstration grants, State program grants, and planning grants programs.

William D. Ruckelshaus

William D. Ruckelshaus
Administrator

RESPONSE TO COMMENTS OF THE ENVIRONMENTAL PROTECTION AGENCY OFFICE OF NOISE AND OFFICE OF FEDERAL ACTIVITIES (keyed to pages and paragraphs of letters)

1. Noise Quality (5/16/73 letter, pp.1 and 2,paragraph 2, 1-7)

The acoustical consultant's reports are available from WMATA for review. A list of the acoustical consultant's reports available from WMATA is presented in Appendix E of Part III of this Study. Additional discussion of noise and vibration standards and criteria, methods of monitoring and enforcing construction-generated noise, and standards for passby noise and techniques for controlling both types of noise, is presented in the Natural and Ecological Impacts subsection of Section 2 of this Report as revised, The Probable Impact of the Proposed Action on the Environment. OSHA Standard adherence with regard to construction-generated noise is discussed in Appendix D of Part III of this Report.

2. Land Use Impact of Metro (5/1/73 letter,p.2, paras. 1 and 2)

The relationship of the Metro system to regional land use patterns and to the revised Year 2000 Policies Plan is discussed in some detail in the Social and Economic Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment.

3. Station Location Policy (5/1/73 letter, p.2, paragraph 3)

Station location policy is discussed under Considerations in Arriving at the Present System in Section 4 of this Report as revised, Alternatives to the Proposed Action. Specific potential adverse and beneficial impacts of Metro stations are identified in Part II of this Report as revised, Route Summaries and Critical Areas Identification. Detailed analyses of such impacts are presented in Route Environment Statements available from WMATA for review.

4. Air Quality; Clean Air Implementation Plan Compliance (5/1/73 letter, page 3, paragraphs 1 and 2)

Estimates of annual vehicle miles of travel, average speeds and emission reductions over the period of Metro construction in the region and the relationship of such emission reductions to the current Air Quality Implementation Plans are presented in Appendix H of this Report as revised, the Air Quality Study. A brief summary of the Study's findings is presented in the Natural and Ecological Impacts subsection of Section 2 of this Report.

Potential Metro-associated complex or indirect sources of vehicular emissions as defined by the current Clean Air Implementation Plans are identified in Section 2 of Part II of the Report as revised, The Critical Areas Study.

The air quality impact of individual Metro stations is analyzed in Route Environmental Studies, available from WMATA for review.

5. Energy (5/1/73 letter, page 3, paragraph 3)

A study of energy impacts of the regional system is presented in Appendix I, Part III of this Report. A summary of the Study's findings is presented in the Natural and Ecological Impacts subsection of Section 2 of this Report as revised, The Probable Impact of the Proposed Action on the Environment.

6. Water Quality and Wastewater Treatment (5/1/73 letter, pp.3,4, paragraph 4)

A region-wide evaluation of potential erosion and sedimentation impacts of Metro construction upon water quality is presented in the Natural and Ecological Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment.

Specific areas with such potential problems are identified in Part II of this report as revised, Route Summaries and Critical Areas Identification.

Anticipated needs for wastewater treatment; based upon changes in population and industrial distributions that may be brought about (in part) by Metro, are discussed in the Social and Economic Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment.

7. Spoils Disposal and Water Quality (5/1/73 letter, p.4, paragraphs 2, 3, 4)

A discussion of proposed spoils disposal at Smoot's Cove and its impact upon floodplains and water quality and a summary of controls applicable to demolition debris is presented in the Natural and Ecological Impacts subsection of Section 2 of this Report as revised, The Probable Impact of the Proposed Action on the Environment. A detailed description of controls applicable to the disposal of demolition debris are presented and discussed in the Ordinance Study presented in Appendix C of Part III of this Report.

Impacts of the crossings of the Potomac and Anacostia Rivers are discussed in the Environmental Impact Statement and Study of the C, D, and L Routes, available from WMATA for review.

W-METRO EIS SC 1 ZA

April 13, 1973

Mr. Martin Convisser, Director
Office of Environmental Affairs
Department of Transportation
400 6th Street, S. W.
Washington, D. C. 20590

To Whom It May Concern:

The citizens of Takoma-District of Columbia strongly object to the Draft Environmental Statement prepared by WMATA in cooperation with the Department of Transportation.

Much of what is said in this study is conjecture for there is no supportive evidence to substantiate the conclusions. For example,

How does a thirty-five feet natural color concrete wall "complement rather than detract from the surrounding environment";

Relocating B&O tracks closer to existing structures - increasing the noise impact - is not a <u>minor</u> long-term impact on the residents along this route;

"The entire Metro System mode of access to and from stations is fairly equally divided between walking and buses." If this is true, why is it necessary to have parking for 300-500 cars at the Takoma Station.

Further, there are some serious omissions such as:

The long-term pollution problems due to the increase in vehicular traffic in the immediate vicinity of the Takoma Station (parking for 300-500 cars, fifty buses per hour during a.m. and p.m. rush hours plus the cars that normally pass through the area going downtown or out to the suburbs.

Economic loss to property owners along Blair Road.

The above criticisms are a few of our initial reactions to the report; further analysis of specific details in the study will be forthcoming.

For further information please contact:

Mr. John Herndon
616 Whittier Street, N.W.
Washington, D. C. 20012 or

Mrs. Ruth E. Foster
6601 Piney Branch Road, N.W.
Washington, D. C. 20012

We realize that this is only a preliminary environmental impact study, therefore, we hope that your final study would include those elements which would reflect the effects of the Metro System on neighborhoods such as Takoma Park.

Sincerely,

John Herndon (R.E.F.)

Mr. John Herndon, Co-Chairman

Ruth E. Foster

Mrs. Ruth E. Foster, Co-Chairman
Environmental Committee
Save Takoma

Honorable Walter E. Washington, Mayor-Commissioner
District of Columbia

Honorable Marvin Mandel
Governor of the State of Maryland

National Capital Planning Commission

Maryland State Planning Department

Maryland Department of Transportation

D.C. Department of Highways

Washington Suburban Transit Commission

Metropolitan Washington Council of Governments

D.C. City Council

Montgomery County Council

Maryland-National Capital Park and Planning Commission

Washington Metropolitan Area Transit Commission

Environmental Protection Agency
Office of Noise

Federal Highway Administration

Council on Environmental Quality

D.C. Redevelopment Land Agency

Advisory Council on Historic Preservation

Department of Agriculture
Soil Conservation Service

Department of Housing and Urban Development
Urban Areas

Mr. Martin Convisser
Director, Office of Environmental Affairs
Department of Transportation

RESPONSE TO COMMENTS OF THE SAVE TAKOMA, ENVIRONMENTAL COMMITTEE (keyed to pages and paragraphs of letter)

1. Metro Design Standards (page 1, paragraph 2, item 1)

WMATA's design standards for Metro retaining walls as well as for other Metro auxiliary equipment are discussed briefly under Metro System Characteristics in Section 1 of this Report as revised, Description of the Proposed Action and its Purposes, and at greater length in Part III, Appendix D, Metro System Characteristics.

2. Noise Impact from B&O Tract Relocation (page 1, para.2, item 2)

A region-wide discussion of Metro noise impacts, including noise impacts from at-grade Metro operation, is presented in the noise and vibration subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment.

Potential specific locations where such impacts might occur and detailed discussion of such impacts are presented in Route Environmental Statements, available from WMATA for review.

3. Parking at Takoma Station (page 1, paragraph 2, item 3)

Metro will not provide parking spaces at Takoma Station; provision for vehicular access to the station will instead take the form of bicycle bays and loading areas for kiss n' riders and for Metrobuses (see Appendix D in Part III, Metro System Characteristics).

4. Air Quality at Takoma Station (page 1, paragraph 3, item 1)

Air quality at Metro stations is discussed in Appendix H of this Study, the Air Quality Study. Air quality at specific Metro stations is discussed in Route Environmental Statements available from WMATA for review.

5. Economic Loss to Property Owners along Blair Road (p.1,para.3,item 2

Enumerations and identification of properties adversely affected economically by Metro construction are presented in Route Environmental Statements available for review from WMATA.

WMATA's policy concerning direct adverse economic impacts upon property is presented in the Social and Economic Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment.

WASHINGTON
Ecology Center
2000 "P" Street, N.W.
Room 612
Washington, D.C. 20036
Phone: 833-1778

RESPONSE OF THE WASHINGTON ECOLOGY CENTER TO DEPARTMENT OF TRANSPORTATION DRAFT ENVIRONMENTAL IMPACT STATEMENT ON WASHINGTON, D.C., REGIONAL RAPID RAIL SYSTEM OF FEBRUARY 1973

INTRODUCTION:

For three years the Washington Ecology Center has been attempting to force the Federal Department of Transportation (DOT) and the Washington Metropolitan Area Transit Authority (WMATA) to draft an environmental impact statement on the approved regional subway system, in keeping with the clear mandate of the National Environmental Policy Act of 1969, section 102 C (NEPA).

WMATA and DOT took the position, over this period of time, that they did not have to comply with NEPA. The WMATA position was expressed in a letter from the General Council of WMATA written in response to questions raised by the Ecology Center regarding the applicability of NEPA to the subway system (dated August 22, 1972, see Appendix A):

> "Although it is clear that NEPA is technically not applicable to the Metro project, our Board of Directors in November 1971, adopted a policy of full compliance with the spirit of the law. Accordingly, an environmental impact analysis was put under contract with an independent firm of environmental specialists. This study is scheduled for completion within the next months and will be submitted to the CEQ."

Meanwhile, according to correspondence found in Appendix A of the environmental impact report, the Council on Environmental Quality (CEQ) wrote to the DOT regarding Metro; this was several months before the last letter was written (June 1972, see Appendix B);

> "We would like to see the overall draft environmental impact statement on the Metro system prepared to be put into circulation at the time of the next request for federal funding, due in late January of 1973...."

"...the Council is led to the conclusion that the most appropriate Federal agency to prepare the impact statements required in connection with Metro is the Department of Transportation."

Clearly in August of 1972, two months following the CEQ letter, WMATA knew that the subway project was indeed applicable to NEPA. Yet as late as 1973, WMATA attempted to fool the public, claiming that NEPA did not apply to the subway system. In a letter dated April 5, 1973, Stanley Anderson in his capacity as Chairman of the WMATA Board wrote (see Appendix C):

"While Authority Actions are not subject to compliance with the National Environmental Policy Act, it is our intention to comply with the spirit of that Act. We have had a system-wide study performed by a consultant engineering firm and on February 27, 1973, a draft of that statement was circulated to all interested parties."

Thus, WMATA continued to maintain that the 'environmental impact analysis' was not issued in compliance with NEPA, but only in keeping with the law's spirit. This was a good way for WMATA and DOT to wash their environmentally bloody hands because, in reality, DOT was circulating the statement in compliance with NEPA officially while WMATA maintained that only the "spirit" of NEPA was involved. The Ecology Center was most suprised, therefore, to learn from CEQ in mid-April that DOT and WMATA were indeed complying with the letter of NEPA. We read about the statement in the Washington Star and becoming suspicious called CEQ. Until then we had no knowledge of the study except for having viewed an interim summary report of a subway line in the WMATA community relations office which made no mention of NEPA.

Naturally, WMATA and DOT hoped to avoid citizen review through this duplicity. Citizens have the right to comment on a draft environmental impact statement and the final statement must address citizen concerns. Yet the existence of the NEPA statement was withheld and the role of WMATA and NEPA was misrepresented , thus stifling public review. Unlike Stanley Anderson's

assertion that "a draft of the statement was circulated to all interested parties", organizations with a history of concern regarding the environmental impact of Metro as well as plaintiffs of several lawsuits alleging that DOT and WMATA must comply with NEPA, did not receive copies of the Metro 102 statement.

At this point, I should review a bit further the Washington Ecology Center's history of involvement in the question of NEPA and the authorized Metro rapid rail system. As early as 1971 we raised the question of the lack of a statement. We questioned DOT and WMATA's failure at hearings, meetings, with various Metro staff members as well as DOT employees and with the CEQ. On one occasion in 1971 the Ecology Center organized a meeting between representatives of area environmental and civic organizations and the WMATA staff to discuss (1) the failure of WMATA and DOT to comply with NEPA and (2) the peramiters of the soon to be funded environmental analysis of the Metro system, prior to the drawing up of the final contract. At this meeting we asked that any evaluation of the environmental aspects of Metro key in on issues, such as alternatives, land use questions (both locally and regionally) and the effect of Metro on areawide transportation planning. Our requests were categorically denied. (see Appendix D for copy of contract issued to Wallace, McHarg, Todd and Roberts.)

The Washington Ecology Center was not issued a copy of the environmental impact study of February 27, 1973. To our knowledge neither was any other environmental organization of the area sent one by DOT or WMATA. After a good deal of difficulty the Central Atlantic Environment Center did receive a copy (see Appendix E); a researcher for the Center, however, was told by the WMATA Director of Community Services that neither DOT nor WMATA was issuing this

statement in compliance with NEPA and that, therfore, the procedures of CEQ for NEPA statements were not germane. Despite numerous requests to the WMATA Office of Community Services the Washington Ecology Center was denied a copy of the statement; we were told that there were none left when in fact there was a drawerfull of copies at WMATA.

At this point David Paris of the Washington Ecology Center attempted to contact the Department of Transportation. He reached the proper person and pointed out the misrepresentation of WMATA while requesting at least a 15 day extension to the comment period as well as a copy of the statement. The DOT contact was fairly sympathetic and said that he would check out a number of the problems mentioned with WMATA and that he would ask WMATA to approve a 15 day delay. The following day he phoned David Paris and confirmed the 15 day additional comment period and stated that a copy should be obtainable from the Office of Community Services. Regarding a request that DOT hold hearings on the environmental impact of Metro he was non-committal. After a good deal of further trouble with WMATA, the Ecology Center finally obtained a copy of the statement from Mr. Patterson of the WMATA Engineering staff.

We submit that the environmental impact study as prepared by Wallace, McHarg, Todd and Roberts neither complies with the letter nor the spirit of NEPA. Copies of the document have been denied citizens who have a history of concern for Metro and its effects upon the environment of the National Capital Region. WMATA has misrepresented the nature of the study and has attempted to avoid public scrutiny of the statement. At this time the relationship between WMATA and DOT in the NEPA process is most cloudy and is in need of clarification.

The Ecology Center, also, feels that it is most inappropriate and perhaps illegal (see Green County Planning Board V. F.P.A. 2nd Circuit) for the DOT to delegate NEPA authority to WMATA who then delegated authority to Wallace, McHarg. Todd and Roberts, and to do so under false pretenses of not complying with the letter of NEPA. We correspondingly feel that DOT is presently in no position to evaluate the Metro system and we therefore request that DOT agree to hold hearings on the environmental impact of Metro, in each jurisdiction; to then draft a NEPA statement and to hold another set of hearings prior to finalization. It is our hope that DOT will be willing to rectify the past shortcomings graciously rather than there being need for citizen organizations, which are advocates of mass transit, to seek court relief. This can be an opportunity for DOT and citizens to work out a model process for NEPA evaluation.

THE STATEMENT:

The Washington Ecology Center finds that the environmental analysis is as bad as we had suspected that it would be, given the perimeters of the study as set forth in the contract (see Appendix D). We noted, during our 1971 discussions with the WMATA staff, that we felt that they were limiting the scope of the study severely by using the most narrow and superficial definitions of 'environment' and 'ecology' possible. We asked that the study deal with the entire range of public policy decisions associated with the regional subway system and that 'environment' be connoted by the widest possible context of its use. At that time we made it very clear that a study "prepared to respond in preliminary form to the concerns expressed in the National Environmental Policy Act of 1969," to quote the contract, must deal with alternatives to the

proposed action, the effect of Metro on area transportation planning and the land use implications of Metro. Instead, WMATA farmed out a study dealing with the superficial trappings of environmental quality -- corrosion, noise, water, soils, vegetation, wildlife, visual features and historic considerations. Certainly all are very proper considerations, but all nonetheless constitute only a superficial survey of environmental impact.

We find the study to be pro forma ritual rather than rational assessment of the environmental impact of a major federal action. We feel that the subway authority and DOT are attempting to keep vital information from other federal agencies, local governments and the public. It is very difficult for citizens to do all of the work necessary to evaluate the environmental impact of the Metro system and to suggest alternative courses of action. The magnitude of the task, of course, is enormous, but an even greater hinderance is because of the failure of WMATA to provide the public with sufficient information necessary for evaluation. There is a WMATA Office of Community Services, with lots of press releases and giveaways on shelves along the wall, but getting hard technical information out of the WMATA staff is like pulling teeth. It is impossible to get necessary data which should be part of any planning process and which is necessary for citizen review. This is because the data is either not in form for public dissemination (is in computer printouts etc.) or the "studies have not been made to date." For example, in late March of 1973, the subway authority unveiled a plan revision which called for dislocating 78 families in the Cardoza Urban Renewal Area, yet the public was neither offered alternative actions nor relocation details ("to be worked out later"). Also, WMATA was able to take over the area bus system without

specifying how it will run the bus system. Presently there is a large-scale, long-term study being performed in this regard; yet it is being carried out as far as possible from the scrutiny of the public, much like the NEPA study.

ALTERNATIVE ACTIONS:

There is no real consideration of alternative actions in the environmental analysis. In fact , the contract did not even call for analysis of alternatives. This is most unfortunate for the residents of the Washington Area because, while consultants are dittling around with the study and lawyers are busy coming up with excuses, decisions which will radically affect the future of the Washington Metropolitan Region are being made without the imput of a NEPA statement truly dealing with alternatives. The purpose of the NEPA statement is to travel through the normal decisionmaking/hearing process as an institutionalized process for environmental consideration (see Calvert Cliffs v. A.E.C. 146 U.S. Ap. D.C.33, 449 F. 2d 1109 1971). The DOT/WMATA NEPA statement is not a document which can affect the decisionmaking process; it is too late and too uncritical. The Ecology Center has been looking for a NEPA statement on the subway system since 1971 and we feel that we are still looking.

There are two levels of alternative actions which must, under the law, be considered regarding the Metro system - alternatives to the total system and alternatives to aspects of the presently planned subway system. We feel that under NEPA both must be investigated. The full range of public policy decisions associated with the Metro system must be evaluated in the statement; there is little doubt that this must include alternatives to non-WMATA actions involving the subway system.

While the statement does run through the history of various alternative subway alignments which were considered during the history of Metro planning, the consultants failed across the board to set forth the reasons why alternatives were either accepted or rejected. The NEPA process calls for rational analysis not merely for cataloging of past decisions. For example, of alternatives A,B&C on pages 132-134, why was IIA eventually chosen? Even more importantly, why do the consultants fail to consider present/future alternatives only dealing with past choices. Consideration of present/ future alternatives must be in the final statement.

DOT must deal with alternatives to the subway system as well as alternative alignments and station sites. There is a curious vacuum in the history of Metro planning regarding comparison of a subway system alternative to the alternative of a truly comprehensive and sophisticated bus system. This dearth of decisionmaking is in the Ecology Center's eyes most suspicious. We feel that there is little question but that busses have been categorically left out of the subway planning picture. To consider the bus system of 1968 as a viable bus alternative is a mockery of the NEPA process and all rational planning. It is most significant to point out that the "Meyer-Kain-Wohl Transportation Report" made for the White House in the early 1960's concluded that express bus service on reserved lanes was a superior way of moving people. Furthermore, the Third Annual Report of the Washington Metropolitan Area Transit Commission (WMATC) recommended busses over the concept of a subway system (see Appendix F). Some of the WMATC's recommendations regarding the National Capital Transportation Agencies Plan for a 98 mile subway sytem were:

> "(1) Under the Agency's plan, the downtown area will be served by only fourteen subway stations, as compared to six hundred forty bus stops presently being served by the existing transit companies."

"(5) One of the major facilities of the rail system proposed by the Agency is that the great majority of people would have to transfer at least twice in using this system."

"(6) At the present time the existing bus companies are providing direct service from origin to destination by operating over four hundred twenty-two different routes as compared to eight rail lines proposed by the Agency."

"(10) Despite the fact that the engineering firm of Wilber Smith conducted a study which strongly indicated that an all-bus system may provide an adequate transit system for the Region, the Agency gave little, if any consideration to this possibility. The Agency estimated that a bus subway, to be tied in with existing highways and streets, would cost only $128,000,000 as compared to an $800,000,000 rail transit program."

Where are they now?: Currently, Wilber Smith Consultants are planning the future of the Metrobus system for WMATA; Delmer Ison, who in 1963 was Executive Director of the WMATC when it issued the above report on Metro, is now treasurer of WMATA.

The recommendation of the WMATC, in the event that a subway system was to be built, is the following:

"If rail transit must be introduced to the National Capital Region, this Commission has recommended that one complete rail line, to be tied in with the downtown subway, be constructed and placed in operation before any additional rail construction is authorized.... Our recommendation may be classified as the economical-viable-segment approach. If one line, located to serve an entire corridor having the highest density of population cannot attract the minimum number of transit riders deemed necessary to justify rail transit, then it would follow that areas of less density would not support rail transit...valuable experience would be gained for future expansion."

The Ecology Center neither endorses nor opposes the idea of a regional rail rapid transit system. However, we can say with a substantial degree of certainty that no true comparison of the two modes has been made at any past stage in the decisionmaking process, dating back to the 1950's. The final environmental impact statement must deal with the alternative to the subway system of a highly developed bus system.

Another mode of transportation which we feel has been passed over by DOT and WMATA has been commuter railroad. There is little mention of commuter railroad in the NEPA draft statement. We again note that no explanation was given by the consultants for the passing over of the Arlie Alternative C for the eventual plan IIA. We have long noted a reluctance on the part of the transit authority to discuss commuter rail with true puzzlement. There is a long history dating back to the 1930's of studies of the feasability of upgrading commuter railroad. In 1971 a study was compiled by Carl England for the Department of Transportation which certainly should be capable of discussing the implementation of commuter rail, with or without the Metro system. This is just what the Ecology Center wants to see; an analysis of the feasability of commuter rail service either replacing Metro in several corridors or serving the function of complementing Metro.

We are most cognizant of the fact that in 1968 the Senate Public Works Committee called for WMATA to take on a commuter rail program to complement Metro. The committee asked that this program be initiated within one year in a study entitled "Metropolitan Area Pilot Transportation Study." The commuter rail program was the one aspect of the study which received almost unanimous approval from the citizens of the entire region. Yet WMATA and DOT have done nothing to implement commuter rail service. In a speech on the Senate floor Senator Beall of Maryland cited a 1971 DOT study which concluded that 12,000 to 14,200 trips each weekday could be achieved after just one year of revitalized rail operation. However, he charged that while WMATA has legal power to acquire or develop a rail commuter system, that it:

"...has shown little interest or inclination to do so thus far."

The commuter railroad system, according to the Senate study, would accomplish many of the objectives of the Metro system as set forth by Wallace, McHarg, Todd and Roberts:

> "Because of the rapid changes that can occur in urban development and expansion, this study outlines in detail a program for the immediate establishment of a railroad commuter service in Washington, D.C. The economic and social justifications for the establishment of such service are:
>
> (1) Source of immediately needed relief from rush hour traffic congestion during the 1--year interim regional rapid transit construction.
>
> (2) Restrengthening of existing suburban development corridors.
>
> (3) Stimulation of outward suburban development in the longer range future primarily within corridors as outlined by regional planning groups;
>
> High-speed rail passenger service can plan an inportant role in the relief of the current and/or future population explosion pressures in major urban areas."

Although the Senate study planning, like Metro's, was affected by the inflated population projections which have now been disproven by analysis of the 1970 census, the Ecology Center feels that commuter rail service would be a sound public investment. We cannot understand why WMATA has failed to implement the recomendations of the Senate report. WMATA should have done so in 1969. The Senate study specifically named WMATA to run the commuter rail service:

> "Operating and administrative control to be placed in a new commuter rail division of the Washington Metropolitan Transportation Authority."

The entire question of bus service takes upon an additional light in terms of NEPA now that WMATA controls the area bus systems. DOT must include the Metrobus system in the consideration of alternatives. Not just as an alternative to the subway system, as was spoken of earlier but, also, as to how the bus system will interface with the subway in the event of the subway alternative. How will the Metrobus system provide feeder service to subway

stops? Should the primary purpose of the Metrobus system be to act as a feeder adjunct to the subway? How will Metro run the bus system? (see Appendix G,H,I&J) What are the alternatives? By what preformance standards will DOT and WMATA judge the bus system by and use in the planning of additional bus service? What is the environmental and social impact of existing and contemplated distributions of bus service (including, in light of the 14th Amendment and Civil Rights Laws)? There is indication that WMATA plans to determine transit need through surveying of existing ridership; will this not predicate future routings in favor of areas which already have relatively high concentrations of bus service?

The NEPA statement must deal with the purchase of subway and bus equipment, inclusing available alternatives. For example: WMATA is about to purchase 600 new busses. What kind are to be purchased? Are these busses the least polluting? How much more fuel will be used as a result of air conditioning on the busses - and how much more will air conditioning cost each rider? Are some of the 600 busses to be smaller ones for winding city streets, as some community organizations have suggested? What are the specifications listed on the bids for the 600 new busses? Specifications are most important, especially because of the magnitude of a 600 bus order. According to William Spreitzer, Head of Transportation Research for General Motors. innovative prototype busses are not put into mass production because:

> "Mr.Spreitzer commented that the RTX is a prototype vehicle which serves as the basis for continuing studies and design programs at the GMC Truck and Coach Division. He noted that the financial requirements and problems of transit operators are such that new equipment purchases are increasingly dependent upon Federal funds which in turn require competitive bidding and contract awards to the lowest bidder. He further added that the lack of specifications on innovative or new vehicles in the public requests for bids prevents consideration of designs such as the RTX, so there is no incentive or motivation for any manufacturer to proceed with such designs." (GM corporation 1973)

How does DOT explain its neglect to set standards for federally funded bids so as to encourage innovation? Would the probably higher cost of the first production in mass of the prototype busses necessarily offset the social gain from any such innovations? (see Appendix J for questions relating to bus service prepared by the Washington Urban League, Committee to Rebuild Upper Cardoxa and Concerned Citizens of Central Cardoza.)

Unless the DOT environmental impact statement considers the entire range of public policy decisions and of alternatives in the course of the final environmental impact statement there will be no compliance with NEPA. This includes the entire question of alternatives to the transportation system as well as to the entire question of land use planning and Metro (which is dealt with in another section of these comments). All policy questions must be considered through NEPA at each important step in the decision-making process (see Calvert Cliffs v, A.E.C. already cited). Furthermore, the NEPA statement must accompany the action through all major steps in the decision-making process including hearings. This is not being done and for every day that passes decisions which affect people's lives and the health and welfare of the region are being made within a totally unscrutinized vacuum without the injection of the institution of NEPA into the process as a means of rational environmental input.

RIDERSHIP:

The WMATA ridership projections give some idea of the assumptions and goals that went into subway planning. First, the ridership projections are based upon construction of all freeways planned for the Metropolitan area (from Traffic, ~~Revenue and Operating~~ Costs, WMATA revised February 1971):

> "The Plan assumes that by 1975 a number of new roads will be in operation including Route 66 and the Three Sister's Bridge in Virginia, the north and east legs of the Inner Loop, the North Central Freeway and I-95 in the District of Columbia, and a portion of the Northern Parkway in Maryland."

> "By 1990 it is assumed that additional roads will include the Outer Beltway, Monticello Freeway, extensions of Indian Head Highway, Southeast Freeway (Maryland), and Central Avenue (Maryland). Should any of these facilities not be constructed, it would tend to reduce the level of highway service and raise the relative usage of the transit system over that estimated in this report."

As they themselves admit, WMATA's shocking assumptions about freeway construction radically affect the modal split between mass transit and cars, to the favor of the automobile. The automobile and mass transit are direct competitors, and the more auto facilities built, the more competition for mass transit and the lower percent transit usage.

In order to forecast sufficient ridership to justify the subway system, WMATA tipped the Metro/auto modal split by using yet another set of illegitimate, jerrymandered figures. WMATA was forced to assume that there would be a great increase in the total number of work-trips to the downtown region. The employment projections of the "Green Book" of the NCPC, the 1967 second revision of the Comprehensive Plan, served WMATA's manipulative purpose. The "Green Book", like the "Red Book" that followed it, assumes that there will be an increase of 40% in downtown employment. This would be somewhere around 160,000 people or so, a most unlikely occurrence even if skyscraper towers are built.

For one thing, there cannot be such an increase in downtown concentration physically. Air pollution considerations alone just will not permit this. The Air Quality Implementation Plan for the Washington Interstate Control Region calls for a reduction of 25% in the present number of auto work-trips to the downtown. Furthermore, it is unlikely that development of such a scale would occur due to insufficient demand. Washington, D.C. is part of a region that includes Baltimore, an international port city which is expanding. The existence of two centers of critical mass in one region will surely inhibit the ability of either to become the overwhelming regional center. In addition, both the lowered area birthrate and President Nixon's determination to reduce the size of the federal bureaucracy should serve to put a damper on area growth. The latter factor is most significant since the Federal Government is overwhelmingly the chief employer of the region. It not only accounts for the greatest percent category of direct employment but, also, provides a massive indirect employment through the many companies which exist to service the government and its workers. The President's goal regarding Federal job-cutting is to achieve a 10% cut in government employment. This would mean a reduction of 33,000 jobs, with an annual payroll estimated at $330 million. Economists further speculate that a 10% reduction in federal jobs would drain off an additional $100 million or more from the area economy, due to loss of supportive civilian enterprises. To put the amount of this loss to the area economy into perspective, the annual Federal payment to the District of Columbia amounts to $194 million for fiscal years 1973 and 1974.

Other Government bodies (either consciously or unconsciously) use the Metro ridership forecasts to justify and demand that there be high intensity development of the areas adjoining subway stops. WMATA has obviously fostered

this myth through issuance of ridership projections which are predicated upon an increase in downtown density. All of this starts from the irrational assumption that unauthorized and officially dead freeways will be constructed.

With regard to the District of Columbia's position regarding areawide highway construction, it is clearly set forth in the Major Throughfare Plan of the NCPC, also, adopted by the D.C. City Council The official "policies" document of the D.C. Government with regard to highway planning is the Major Throughfare Plan (see D.C. Code, section 1-1006 a) The last revision of the Plan, dated 1968, sets forth a clear philosophy regarding freeway construction:

> "The Commission's major thoroughfare plan does not call for any new gateway arteries that would increase vehicular flow into the District, by bridge, tunnel, or surface street....the Commission believes that a policy that seeks to limit the flow of automobiles into the heart of the city is a practical and realistic approach to transportation planning. The commission would go so far as to say that through no other approach can it meet its basic planning responsibilities...."

Of course the planning responsibilities which the NCPC speaks of are even greater in 1973 than in 1968 due to the magnitude of the present air quality crisis and the mandates of the Clean Air Act of 1970.

The Major Throughfare is the official planning document for highway of the District Government. It sets forth policies and principles. For a road not to be listed in it rules out any action regarding it by the D.C. Highway Department and presumably WMATA. The fact that this document leaves out the Three Sisters Bridge and the North Central Freeway means that they are dead issues. Furthermore, none of the freeways to be constructed in the District contained in WMATA's ridership projections are in the Permanent Highway Plan (D.C. Code, section 7-108). This section covers takings by eminent domain. There is, therefore, no basis in fact for WMATA to assume construction of an unauthorized freeway system in the District (see Appendix K for more information on the legal status of the D.C. freeway system.)

The Outer Baltway, I-70S, I-66 and I-95 are all not designated for construction in Maryland and Virginia. The Ecology Center has no knowledge of the status of the other freeways listed. We can think of no legal or moral reason why WMATA should assume construction of uncommitted freeways as we understand the WMATA Compact, the subway authority has no mandate to plan highway construction. It must adhere to the policies of the various governments of the region.

The Final Environmental Impact Statement must deal with the WMATA ridership projections. Moreover, the 102 statement must investigate the relationship of the subway/metrobus system to the entire transportation system of the region. This is a most important portion of the consideration of alternatives.

The effect of Metro ridership projections upon area land use patterns must, also, be investigated. Is high density development of all Metro stop areas necessary to made Metro pay? Certainly, it can be stated that WMATA has offered no rational analysis of this question. This whole problem must be investigated under alternative sets of assumptions and transit systems, with the different alternative conclusions clearly set forth for federal and local decisionmakers as well as the public.

METRO AND LAND USE:

As dicsussed in other sections, the Metro subway system will have a profound impact upon land use patterns of the area. There is every reason to believe that public policy decisions being made regarding land use around stops will contribute to environmental degradation.

A most important aspect of Metro land use impact involves the question of WMATA owned properties - acquisition, use and disposition. Although WMATA has the power to condemn land through the use of eminent domain powers, there is at present no WMATA policy regarding disposition of acquired land. This is a very serious matter since WMATA is one of the largest property owners in the District, especially considering air-rights potential for station areas. Holding of this land will have a profound environmental and economic impact upon the region. What will be eventually done with this land? What basis will there be for decisionmaking regarding disposition? What role will local governments and citizens have in decisions regarding use of WMATA owned land? To whom will the land be leased, sold? According to the information presented in the environmental report regarding dislocation, almost all WMATA condemned land is taken from poor people and small merchants. Is WMATA policy regarding use of land, which it presently owns, going to further redistribute benefits from the poor to the rich? How can WMATA possibly repay the people of Upper Cardoza, in a Neighborhood Development Program area slated for rehabilitation, whose lives will be destroyed for subway construction? How can WMATA repay the small businessmen of Gallery Place? How can an environmental impact statement be written in the absence of a WMATA policy regarding use of WMATA owned land?

On page 75 the environment report speaks of the effect of Metro in implementing the Wedges and Corridors plan. The consultants, however, do not assess the evnironmental impact and status of this "Year 2000 Plan". Many planners as well as environmentalists feel that this plan has been a failure and that it was doomed to failure from inception. Many conservationists have pointed out that the drawing of wedges and corridors on a map has no rational basis, such as a study of regional ecological land use potential. Consequently, many areas in wedges are most suitable for development and, conversely, many areas in corridors are not. Furthermore, since at the Year 2000 Plan's adoption there was insufficient appropriation of public monies for open space acquisition, (and this is still the case), much of the 'wedge' land is currently developed or is being held in speculation. The cost of acquisition of wedge land by the area governments is not prohibitively high due to the vast increases in land use potential and value which the years have brought since the plans inception. The opportunity for a Wedges and Corridors Plan, irregardless of whether or not it represents sound planning, is past, due to the increase in cost of land acquisition and due to quantity of development already located in the wedge areas.

To once again return to the issue of land use for Metro stop areas, a problem which unlike the Corridors and Wedges Plan is specific rather than academic conjecture, it can be safely stated that all areas adjoining Metro stops are feeling pressures for high intensity development. The consultants speak of increasing density of development for the Metro Impact Areas. In our opinion this would mean that the subway system is being built to serve future populations rather than existing residents who paid for the subway and who must often put up with the inconvenience of Metro construction. If

Metro does not serve existing residents then it will not be solving the existing problems to the environment but instead will be creating new ones.

The consultants do not understand this. They write of Metro as though they are playing with a plastic model of a region ~~rather than an area with~~ real problems:

> "Land use regulations designed to promote more intensive, well-planned development around Metro stations."

This is planning based upon how things should look on maps rather than upon the specific ecological realities of the station site. The consultants assume that Metro stops are the right places for development to occur. This is not necessarily true. It can be safely stated that many conditions regarding placement of Metro stops cannot at this time be rationally explained. Even if stations were planned for areas slated at one time for development, there is no reason to assume that high intensity development of the area is still desired or desirable - especially at this time of downward revision of demographic projections, the contemplated contraction of the federal bureaucracy, as well as the diseconomies of growth and the reality of air pollution. These 'expert' planners do not deal with the environmental impact of their wholesale simplistic planning policy other than through their, likewise, simplistic reference to the Corridors and Wedges plan.

The concept of Metro Impact Planning is being foisted upon the citizens of the region by WMATA and by area planning authorities. The concept of Metro Impact Planning basically embodies a philosophy of 'if rape is inevitable, enjoy it." This is what citizens are being told; that they are in the way of progress, that they are selfish; that they must pick the least damaging plan; that they're being u-p-g-r-a-d-e-d....Families are being told that since

pressures for high density development around Metro stops are so overwhelming, that nothing can be done by the community except to pick the most acceptable, least disastrous plan. Some Choice! Citizens are told to fight among themselves to decide who will be upgraded and who will be saved. There are meetings, and there are advisory panels. Residents of communities such as Takoma Park, Upper Cardoza, Falkland, Friendship Heights, Downtown D.C. and Brookland are all being asked to accept the sublimation of these unstoppable forces through transit impact plans. Notwithstanding, words which are used to mask the truth, such as coordinated, adjusted, harmonious, in scale, orderly, planned and last but-not-least, progress, citizens are just being asked to take a sugar-coated version of the bitter pill.

DOWNTOWN URBAN RENEWAL:

As has already been demonstrated, the ridership projections of WMATA are inaccurate. undependable and biased towards unnecessary development of the Washington downtown core. These projections have led to the conclusion that "development around the downtown stops is necessary to insure a well functioning Metro." The Downtown Urban Renewal program, consequently, calls for high intensity development of the first action areas of the Neighborhood Development Program which are all located adjacent to the downtown Metro stops at 12th & G and 7th & G streets, N.W. In addition, plans are advanced for the area just below the Mt. Vernon Square Metro stop; they call for the construction of a Convention Center and International Cultural and Trade Center, as well as a great deal of supporting development. According to testimony of former Chairman Edwards of the NCPC, before the City Council in June of 1970:

> "The urban renewal process would be used to acquire sites in subway impact areas around two key stations in order to stimulate private investment, to realize the maximum economic potential of these locations and to encourage the use of the rapid transit system..."

The entire Downtown Urban Renewal Program and, in fact, the entire body of decision-making regarding city planning is based upon the assumption that there must be high-density development of the downtown core to made Metro work and to rejuvenate the city economy. Planning decisions in this regard have been made by the NCPC, RLA, City Council, HUD and WMATA, all without the benefit of the NEPA 102 process. An environmental impact statement on the Metro subway system must cover the broad range of public policy decisions associated with the construction and operation of the regional rapid-rail transit system.

According to HUD:

> "Location of economic activity is a critical factor to consider in developing the retail core and the urban area around the 'hub' of METRO, i.e., the METRO Center Station and the Gallery Place Station.

Given the purpose of this renewal activity, i.e. to establish a retail core spine and focal point which ties together the retail core, it is essential that the disposition action occur at the five sites, which are adjacent to these downtown METRO stations presently under construction."

"...it is doubtful that a reduced density alternative would stimulate the expanded business opportunities provided for in the 'full density' renewal action, and it certainly would not blend as well with <u>the thrust of METRO and its objectives.</u>" (emphasis mine)

The entire range of public policy decisions involving Metro and urban planning around stops has not been included in the DOT/WMATA NEPA process. The Ecology Center does not contend that the NEPA process must be duplicative and redundant. The NEPA process is rational, and agencies preparing 102 statements should be able to utilize information from other NEPA statements dealing with a common aspect of interfacing environmental impact. However, there has been no competant evaluation of the range of public policy decisions associated with Metro, urban renewal and other planning actions. The failure of HUD and NCPC to adequately deal with the environmental impact of construction around downtown Metro does not exempt DOT from the obligation to deal with these critical issues precipitated by subway construction and operation. Even if HUD and NCPC dealt with these questions in the NEPA process regarding urban renewal, there would still be the clear mandate under the law that DOT also review downtown planning in the Metro 102 statement.

The Neighborhood Development Program of HUD for the downtown core area will have a most profound effect upon the environment. The program is based upon:

"...ensuring the sucess of METRO with a new downtown focal point." (HUD, 1972)

The NDP program will eventually dislocate 2,500 small businesses according to former Chairman of the House District Committee, John L. McMillan. The first

five NDP "Action Sites" involve 130 business establishments of which 64 are retail businesses, 47 are service establishments, 2 wholesale operations, 2 manufacturing concerns and 15 other firms. The planned highrise construction would house 14,000 workers on the sites which now employ 1,000 workers. Employing the WMATA modal split computations (assuming for the minute that they are correct) this means that the additional development will generate 4-5,000 additional automobiles, at a time when the D.C. Air Quality Implementation Plan calls for a reduction of 90,000 downtown core auto commuters. Washington, D.C. is the most auto congested area in America with a rush hour density of 5,000 automobiles per square mile and downtown urban renewal will contribute to degradation of the air quality of the area.

It is not relevant to point out, as RLA tried, that the 1405 off-street parking spaces, which the NDP disposition controls for the five action sites call for, are factors limiting auto congestion. This is because there is a strong likelihood that additional parking capacity can be provided on adjacent blocks located on the outer fringes in the core in concert with pedestrianization of F & G Streets, another hoax. This creation of an auto-free-zone directly in the vicinity of the first action sites accounts for the relative dirth of parking. According to the Official Urban Renewal Plan of the NCPC:

> "436.00 Approximately 30,000 off-street parking spaces should be provided in the Project Area south of Massachusetts Avenue by 1985 to serve shoppers and downtown workers. Parking space should be provided in structures located close to freeways and arterial streets.......Off street parking serving users along F and G streets in the retail core should be provided primarily in off-street parking facilities along E, H and 6th streets, N.W."

There is an additional environmental question of priorities of the NDP program, and WMATA/DOT decisions, also, play a substantial role in this question. The NDP program of HUD/RLA/NCPC is a package involving all of the NDP areas -

Downtown Core, 14th Street, Shaw School, H Street. The question of priorities is, therfore, very pertinent. This is because monies devoted to one of these programs are denied to the others. Presently, all of the inner city renewal programs are stalled because there are no financial resources. Yet, planning and development efforts continue to be devoted to the Downtown NDP Area which is the most prosperous section of the city. This allocation of resources is partly justified on the basis of making Metro work, according to the Environmental Protection Agency commenting on Downtown NDP #3:

> "...the underlying idea behind this neighborhood development project is to increase the concentration of trip ends within walking distance of Metro stops. Today density and extent of development in some parts of the downtown area cannot justify rapid rail service, the addition of 14,000 workers from this project will go a long way toward creating a workable Metro.....opinions about the specific form that higher density development should take do not fall within any of the Environmental Protection Agency's expertise....We feel that alternatives to the proposed project have been adequately discussed."

The President's Council on Environmental Quality offered a contrasting view to the latter EPA point (all comments taken from a NEPA statement for NDP #3):

> "In our judgment, the analysis leading to the proposed action (NDP #3) when compared to alternatives available, is not convincing...."

The Department of Interior, also, linked up the Urban Renewal Program with the Metro subway project:

> "The proposed action implements a small portion of the Downtown Urban Renewal Area and is interrelated with development of the subway system. Accordingly, it is sometimes difficult for the reviewer of the draft statement to distinguish clearly the environmental impacts of the project from those of the more comprehensive Downtown Urban Renewal Project and of the subway system now under construction."
>
> "We believe that social impact of the proposed action merit further consideration and analysis."

The EPA like HUD simply make the point that high density development is needed to make Metro work. This is clearly based upon the WMATA ridership projections, for otherwise how could they make such a statement free from caprice. In the

absence of sound ridership projections there can be no sound land use decisions regarding Metro stop locations.

The largest question involved is the issue of money being diverted from the poor inner city NDP areas and being given to the rich prosperous downtown business area. As if planning for the five action sites and for a Convention Center/International Cultural and Trade Center complex through countless studies was not enough, a new expensive study of design for the creation of a pedestrian mall along F & G Streets, in the Downtown is currently in progress. This study is funded by HUD/RLA and is a design fesibility study dealing with a 30 million dollar public investment. Again the assumption of development and Metro plays a central role in the suppositions of the study:

> "In 1974 METRO begins operations, and by 1980 metropolitan mass transit service will be complete. Its two major transfer stations, Metro Center and Gallery Place are within the retail core, four others are close by. The Neighborhood Development Program Action Sites immediately adjacent to the Metro Center and Gallery Place Stations create immediate new office, retail and hotel opportunities, in conjunction with METRO."

> "The central concept is to create two new zones of major investment and intensive activity. These zones cluster around the METRO stations and NDP Action sites at 12th and G Streets and 7th and F Streets. The improvements involve large-scale coverings of the street....The large structure proposed above the Metro Center at 12th and G, like the famous Milan Galleria, would give sheltered access to a great diversity of shops, offices, eating and entertainment places as well as METRO entrances. Additionally, it would be a place of leisure amidst trees, flowers, and foliage; it would be a downtown information and hospitality center for visitors and others; it would be a place for changing expibits of local or national importance.....The structure proposed for 7th and F would be a public arcade......There a shopping mother or a family of tourists might find diversions for children such as an aviary, a children's zoo, a carrousel, a play area, and child care services.....new activity centers, new gateways for tens of thousands of persons per day....With the Eisenhower Civic Center to the north, the treasury to the west, the Pennsylvania Avenue redevelopment to the south and the Municipal Center to the east.....Canopy extensions and service clusters, which would include newspaper stands, mailboxes, telephones, toilets, and other facilities, would create a rythmic series of spaces... The total cost of these recomended improvements would be $30,000,000 if built today. If staged over a five year period construction

> cost could be expected to increase because of escalating prices......These improvments can vastly increase the confort and amenity of downtown for those who now use it. Coupled with METRO, the new office development in the area, the Eisenhower Civic Center, and other visitor attractions, these improvements can begin to improve the image and reverse the decline of the retail core." (Asley/Meyer/Smith)

So, RLA has a study called "Streets for the People" drawn up by a highly paid consulting firm (Asley/Meyer/Smith, Inc.); and RLA will probably hire a couple of black frontmen ~~to run~~ around the city with a glossy slideshow to try and fool the people. But, they are assuming that the people in the inner city are stupid. The objective reality of a prosperous downtown and a decaying inner city is too great to hide. "Exciting concepts" and "bold statements" are not for inner city residents who must fight for survival in a hostile social structure which seeks to subjugate poor people. This plan, which is clearly predicated upon Metro, calls for making the downtown even more of a rich, fat, well-to-do racist enclave:

> "reducing street noise, pollution, congestion and sometimes indifferent and discourteous service..." (Asley/Meyer/Smith)

The plan would make the downtown even more isolated from the realities which are so much a part of inner city life. For, in the inner city, there is street noise, pollution, congestion, and sometimes indifferent, discourteous service, as well as poor transportation. Above all there is poverty. The downtown is better off in all of these areas but crime. There is more crime going on in the District Building and the Banks than in the rest of the city combined. There is more crime being perpetrated on the 9th floor of 1325 G Street and 950 L'Enfant Plaza than in all of Cardoza. Furthermore, in Cardoza there are no:

> "...improved street facilities and services, plants and trees, decorative pavement, fountains, sitting areas, telephones, public toilets, and free entertainment."

By now our point should be crystal clear, that the combined planning and action priorities of the Federal and District governments are redistributing services,

planning funds and public projects away from the poor and to the rich. There is a direct relationship between government efforts to build up the downtown (including the Metro subway system) and the neglect of the inner city. Further downtown growth will occur at the expense of the inner city. Even HUD and NCPC acknowledge this fact:

> "With less density on the five (5) action sites, it is possible that additional development would be generated or picked up elsewhere in scattered fashion because of market forces. Such dispersal of commercial development as noted above could have major potential adverse environmental impacts at the locations where development would occur." (HUD NEPA statement NDP #3)

> "Also, if development were not to occur on the five (5) action sites, market demands would force it elsewhere, thereby creating the same increased demands on urban services such as water, sewer and energy systems. As a result, there could be potentially major adverse consequences on the utilization of METRO..." (HUD,ibid)

> "The major alternative to the development of the municipal office space proposed on Square 483 would be to develop this office space at scattered locations throughout the city." (NCPC, NDP#4)

It is not just a question of development; it is a matter of planning funds and public expenditures for services and for construction of supporting infrastructure. In the 14th Street NDP area, for example, RLA has failed to maintain adequate levels of city services in the area and to maintain its own properties. This inaction has caused deterioration of residential sections of the Cardoza community according to both citizens and an official D.C. Government Report of the area's Service Area Committee (SAC area #7).). The commercial strip of 14th Street was burned out during the 1968 riots, however the residential deterioration has occurred since the area was placed in urban renewal status. In this light it is difficult, indeed strange, to hear HUD and NCPC all of a sudden so concerned about the environment of the ghetto when the question of priorities comes up.

To pursue the history of downtown planning just a little further back, while nevertheless remaining within the time span of NEPA: In April of 1970 Development Research Associates completed a study for the RLA entitled, "The Impact of Land Use Controls and Other Factors Upon the Downtown Urban Renewal Area"; the consultants had already completed a study in 1968 of "The Economics of Metro" for WMATA. The 1970 study concluded that Metro could become an impetus for redevelopment of the downtown if other public policy decisions were made to buttress the impact of the subway. They also offer the opinion that Metro will not alleviate traffic congestion but that the subway will instead eliminate auto access to the downtown as a development rate limiting factor:

> "The completed Metro system should substantially alleviate the growing problem of vehicle access into and out of the downtown area. This is not to say that rapid transit will replace the automobile, thus freeing streets from congestion. However, the Metro will permit downtown development which is not dependent upon the automobile alone. Thus, while traffic congestion will continue even after Metro is completed, a reasonable and desirable alternative to vehicle transit will be available."
>
> "This is an important influence. For instance, prior to the authorization of the San Francisco Bay Area Rapid Transit (BART) development in downtown San Francisco was beginning to stagnate due to the growing difficulty of the suburban work force to commute to the city. With an assured alternative transportation system, developers could commence new construction in downtown recognizing that lack of access would not be a constraint to marketability."
>
> "In regards to parking, transit will not replace the need for parking in the downtown. However, as in the case of access, by presenting a reasonable alternative to automobile transportation, the Metro will permit continued development which is not tied to the availability of automobile parking spaces. Thus, in regard to both access and parking it can be concluded that the new metro system could permit a continued concentration of persons in downtown allowing, in turn, a more efficient use of the downtown area as a center of employment and other economic activity. Such concentration can continue at a rate which is independent of the capacity of the downtown area to absorb the movement and housing of commuter automobiles."

Metro will not decrease the District's transportation and air pollution crisis; this is, also, true of BART. According to the Ultimate Highrise written by the staff of the San Francisco Bay Guardian, BART was built to contribute to the conversion of San Francisco to a city of skyscrapers:

> "It's the same old story. BART will benefit downtown interests attract thousands of new commuters, and immeasurably worsen all the high-density problems from which the city now suffers; higher cost of municipal services, rising land values and taxes, fewer jobs for residents, middle class exodus, destruction of neighborhoods."
>
> "BART will be especially effective in destroying neighborhoods. Stations currently under construction in the Mission district, Glen Park and Balboa Park insure that those areas will shortly switch to high-density land-use patterns. BART extensions scheduled for the Richmond and Sunset districts in the middle 1970's will have the same effect there."
>
> "So far, BART's construction costs alone amount to at least $2.2 billion just for the skeleton three-county service scheduled to begin operation in 1972. To understand how large that figure is, keep in mind that it's $300 million greater than the 1970 assessed valuation of the entire city of San Francisco."
>
> "That's not the end of it. In 1962, BART was sold to the public as a means of cutting down congestion and smog. It will actually do just the opposite. Even when fully operative, the BART line, according to estimates made by BART engineers, will carry a maximum of only 300,000 commuters per hour. That is, it will handle only 10% of the current commuter flood. But the construction of BART has caused a flurry of new downtown development which promises to increase commuters by 30% in just the next three years and 100% by 1990"

According to the next study of Development Research Associates for RLA, one which also involved Okamoto-Liskam planners, the picture further unfolds: (from RLA publication "Preliminary Operating Assumptions and Design Criteria for the Downtown")

> "In 1974 METRO rapid transit service will begin operating in Washington, D.C. The two major transfer stations will be located at 12th and G streets and 7th and G streets in the Downtown Urban Renewal Area. (DURA) The opening of METRO ....

provides the opportunity and the incentive to undertake the best possible redevelopment of the center of the National Capital..."

"And now there is METRO - the one development which may be big enough and exciting enough to stimulate the revitalization of the Downtown if approptiate complementry programs are undertaken quickly and efficiently."

As for the rest of the study:

"......lacks strong character and visual image.....a form-giving focal element........a linear spine of activities............... a connection........a symbolic link....assure coordinated relationships.."

A most fitting end to this section of our comments is a quote from Charles Cassell as he testified before the Joint Senate-House Hearings on a proposed Convention Center to be built over Chinatown: Mr. Cassell, as a member of the D.C. School Board is one of the nine elected officials in the colony of the District. He is also Vice-Chairman of the D.C. Statehood Party and a long time member of the Emergency Committee on the Transportation Crisis:

"These are all appropriate things for the Nation's Capital. But are they appropriate to be located in the heart of a black community, where development is badly neglected, where housing might be utilized for us, where we might benefit to own and operate small businesses in conjunction with the Chinese businessmen and in conjunction with the Anglo-Saxon businessmen who are there now..."

Plans are far advanced to construct a Convention Center in the heart of Washington's Chinatown community. The Chinatown location was chosen because of its proximity to Metro stops. In a 1971 document, the NCPC stated that one of the nine criteria for site selection for a Convention Center/ Sports Arena complex was proximity to Metro:

"Subsequent study by the Commission staff necessitated the addition of two more criteria (to the original seven).....Contribute to the physical and economic revitalization of the Downtown and be strategically located to Metro and other rejuvenation efforts."

Was this rational planning to locate a Convention Center complex which would service, primarily, visitors to the area, right next to a radial underground railroad leading to the suburban bedrooms of government workers? This height of irrationality is certainly a most important public policy question involving the Metro system and, therefore, within the purview of the DOT subway NEPA statement.

The site selection process for determining location of the Convention Center and Sports Arena Complex was irrational, yet WMATA said nothing. Furthermore, while there is a certain logic in locating a Sports facility in a location adjacent to mass transit, there are certainly no grounds to place a Convention Center for visitors right next to a suburban subway. Consequently, a site selection process which had some degree of merit (technical but not social or moral) in determining where to put a Sports Arena is in no way even remotely a valid methadology for locating a Convention Center after the Sports Arena is no longer to be part of the complex.

The primary transportation need of the out-of-town tourist is for feeder bus service to government buildings, hotels, stores, restaurants, museums, the Kennedy Center and other such unique attractions of the Federal City. Accordingly, a much sounder logic would have been to construct the Convention Center on the Mall, at the site of the demolished temporary Navy Munitions buildings. This more unique setting amidst the dignity of the Federal City would permit the preservation of Chinatown and would serve to allow for a dispersal of any beneficial economic impact onto a larger area of the downtown.

All of these questions could have been raised during the planning process by WMATA. Instead the transit authority remained mute. The Ecology Center demands to know why WMATA did not point out the lack of utility in placing the Convention Center next to a Metro stop. Inaction can have just as much

of an adverse environmental impact as action; WMATA was silent. Certainly the subway authority has a level of responsibility.

The question of the Convention Center must now be included in the NEPA statement on the Metro system. The construction of the Convention Center will greatly impact the Chinese community. Not only as a result of land condemned for the facility itself, but also as a result of development generated. I would like to direct DOT to the Joint Senate-House hearings that were held in 1972 regarding the Convention Center (see Appendix P). At the hearings Congressman Snyder of Kentucky realized that the Center would impact Chinatown not only as a result of the condemned land for the facility but also as a result of the development generated - "the ripple effect." Much of this was investigated by Congessman Snyder's questioning of Walter Washington, Commissioner of the District. At the same hearings Mark Evans, one of the foremost promoters of the Convention Center, claimed that the facility would probably lose money but that its value was in the development generated. Stephan F. Lee, former Mayor of Chinatown, testified at the hearings for the Chinese community. In his testimony he pointed out that the present crowded conditions of Chinatown did not develop naturally; he attributed poor present conditions in Chinatown to former government appropriation of Chinese land:

> "It is about 4 years ago that Mr. Fong just expressed to you that they took all the Chinese homes and businesses on Sixth Street between H and I. That is a whole block. They promised us so many things. They even had the Chinese make applications on where they were going to move to, and all of that nice talk.....But after they took it down, they have not done anything for the Chinese. That is why most of the Chinese are today living like sardines in Chinatown."

> "You see you (Congressman Grey) go down there and have some chop suey and a Chinese drink for lunch, and you get out as soon as you can, but the poor guys there are suffering. That is why I pointed out to you, Mr. Chairman, that if you can not fulfill your promises do not do it."

Equally compelling was testimony of Charles Casselle, of the School Board of the District and an architect/urban planner by profession:

"Now we in the D.C. Statehood Party, The Emergency Committee on the Transportation Crisis, and all of the various organizations that I talk to and deal with in the course of my daily work, are strongly opposed to a convention center or sports arena or any other large undertaking in the center of the city in Washington, D.C........But can you imagine what would happen in Mount Vernon Square area if you had a gigantic convention center with the tremendous parking facilities that would have to be provided for those automobiles, with those automobiles getting in and out of that center, whatever the parking facilities would be, with the long waits that they must suffer in line, with motors idling, whereupon the pollution is even higher.....We all know that the traffic in Washington, D.C., is practically at a standstill during the rush hours, and I'm wondering what streets would be widened in order to handle the amount of traffic that would be coming into such a parking facility."

"There is another sinister aspect to this proposal You know that the freeway planning in Washington, D.C., has been done in such an autocratic way as to deprive the community of knowledge about it, to say nothing of participation in that planning, that the courts have found such planning to be illegal and they've stopped it. One of the most outragious parts of the freeway plan was a north-central leg which would have gone right up through Brookland and taken hundreds of homes, of people who spent their lives building the capital and building the resources to building their own homes. I understand that this is the American way; we all aspire to that kind of stability. The court's findings and the City Council's response to those of us who were able to bring some pressure upon it, was to eilminate the north-central leg. The compromise for that was then go for a New York Avenue Industrial freeway. Where does that lead to? Right straight past the proposed convention center."

DOT must consider all secondary Metro station land use impacts in the NEPA process. To do otherwise would be a mockery of the process. As the Department of the Interior Wrote of the NEPA statement written for NDP #3:

"The proposed action implements a small portion of the Downtown Urban Renewal Area and is interrelated with development of the subway system. Accordingly, it is sometimes difficult for the reviewer of the draft statement to distinguish clearly the environmental impacts of the project from those of the more comprehensive Downtown Urban Renewal Project and of the subway system now under construction."

The Ecology Center feels that enough controversial questions regarding the Metro system have been revealed regarding the downtown core and NDP programs alone to warrant a full DOT investigation of WMATA - this is not only the law, it is the moral obligation of the Department of Transportation. Hearings must be held on the environmental impact of Metro. Furthermore, DOT must consider all of these questions in the NEPA process. It is sad when unpaid citizens must do the work of government agencies and highly paid consultants.

DISLOCATION OF SMALL BUSINESS ESTABLISHMENTS:

The environmental impact study very amply states that only the weakest of the area business community are to be destroyed by Metro:

> "Most of the businesses to be relocated are small and do not employ many people."

Thus, WMATA and Jackson Graham pursuing their brutal, 'survival of the fittest philosophy' will destroy the small and the weak. Just as Metro will dislocate only poor families, with few exceptions, so too will the subway only destroy the smallest of the business community. Most of these small businesses dislocated will never open up their doors again.

Relocating businesses can be thought of in biological terms even beyond WMATA's survival of the fittest mentality. An animal or plant which is removed from the circumstances under which it developed is not likely to survive in its new environment. Or, if it does survive, it is modified to such a degree that it is unrecognizable. Similar effects occur regarding displacment of small businesses and this is why most efforts to relocate small businesses fail.

A study by Basil Zimmer entitled, "The Small Businessman's Relocation" (from Urban Renewal: The Record, the Controversy, James Q. Wilson, ed), demonstrated that, over a five year period, 40% of small businesses displaced by urban renewal activities in Rhode Island were discontinued. The highest "fatality" rate existed among the smallest business establishments. Those businesses continuing in new locations paid rents that were on the average double their pre-move rates. On the whole, sales declined and rent, as a percentage of sales, increased by 24%.

According to HUD, urban renewal projects from 1950 to 1968 dislocated over 60,000 small businesses through 1,000 urban renewal projects in over

500 cities. Furthermore, they report that eight cities account for 1/3 of all displaced small business establishments (19,878), involving 16% of all projects (158). Of these eight cities, Washington, D.C. was one of the most prominent displacers with 1,032 displaced small businesses through 7 urban renewal projects. (Figures from HUD tabulations prepared for U.S. Congress Subcommittee Number Five of the Select Committee on Small Business, 1965.) Some 748 small business establishments were displaced from the District's S.W. Urban Renewal project. The House Committee on the District of Columbia reported that 62% of these displaced businesses never reopened their doors. Only two businesses remained in the area, and the cost of doing business substantially increased for them. Chains came in to replace small businessmen in the new shopping centers built over the former homes of 23,500 families, of whom 70% were low-income black households. And the result of S.W. Urban Renewal, an $185 million investment of federal and local dollars, is a present gross income of $3.6 million dollars in taxes or less than 2% return on public investment annually. For the businesses there now, the rentals in the new facilities are several times the former rentals, and are, indeed, several times the rentals paid by the small businessmen in the subway stop areas of 12th and G, and 7th and G Streets, N.W.

In Chicago two urban renewal projects displaced 641 small businesses for clearance. Of these 31% (207) went out of business following dislocation. An additional 30% (201) reestablished themselves but did not long survive dislocation. Only 233 establishments remained in business, 83 remaining in the areas, 86 relocating to adjacent communities, 55 moving elsewhere in the Chicago area and 9 moving out of the region. (from Impact of Urban Renewal on Small Businesses, Berry, 1968)

This is all very relevant to an environmental impact statement on the Metro subway system, for several reasons. The Metro subway system will dislocate small businesses through construction of the subway. The WMATA system will, also, dislocate small businesses as a result of development generated around the station areas. This problem is, likewise, a major public policy decision associated with the Metro subway system. As has been demonstrated, the ridership projections of WMATA have led to the myth that "development of the Metro stop areas ~~is necessary~~ to make Metro work." Comparison of relocation rates of urban renewal projects to those of subway relocation is most valid, both because RLA is the relocation agency for WMATA as well as urban renewal, and due to the fact that Downtown Urban Renewal is predicated upon the assumption that Metro needs high density development to work.

A Special Subcommittee of the House District Committee, in 1962 and 1963, studied the redevelopment program in the District of Columbia. Although the Downtown Urban Renewal Program was in a preliminary stage the Subcommittee reported that Downtown Urban Renewal would eventually displace 2,500 small businesses, most of which would be forced to close their doors permanently and those which survived would undoubtedly be forced to relocate to other areas. Clearly such a plan is not concerned with rehabilitation, or the requirements of the 'section 307 provisions of the Housing Act of 1964 which must be circumvented.

Having been denied protection under section 307 of the 1964 Act, the small businessmen of the downtown are challenging the entire urban renewal plan for the downtown area in court, on the basis of denial of due process. They claim that HUD's denial of their constitutional right of due process by

refusing to afford the small businessmen the opportunity to challenge RLA's slum and blight findings, constituted denial of due process rights.

RLA continues to plan for the development of the 6.7 acres of land clustered around the future downtown core subway stops. These sites contain 78 buildings, 130 businesses and 50 residential households. This is valuable property and any action taken on it will greatly affect the environmental quality of the entire central city. The small businessmen's organization, Businessmen Affected Severely by the Yearly Action Plan (BASYAP) has filed suit against the D.C. City Council, RLA, NCPC and HUD for failure to comply with the National Environmental Policy Act regarding the Downtown NDP Program. A preliminary injunction was granted on March 15, 1972, but was stayed until July 13, 1972 and then until October 13, 1972. The BASYAP is appealing this decision and one central aspect of the appeal is the claim that the plaintiffs did not consider alternatives to the proposed renewal action in the 102 statement (which was finally written due to the litigation) (see Appendix O).

Not only were alternatives not considered regarding the downtown urban renewal program but HUD/NCPC did not do an environmental impact statement on the entire Neighborhood Development Program of 14th Street, H Street, Shaw School and Downtown NDP Areas. This was, therefore, piecemeal planning which failed to deal with the question of priorities of the NDP monies. Furthermore, since the NCPC and D.C. City Council made urban renewal decisions since 1970 for NDP's #1,2,3&4, all without the benefit of a NEPA statement serious negligence has occurred. In testifying before the D.C. City Council on NDP #4, on this point, David Paris of the Washington Ecology Center warned:

> "At this point, I want to warn that any declaration regarding NDP #4 that the City Council makes is illegal. This is due to the lack of an environmental impact statement on the proposal, NDP #4....."

As pointed out throughout this discourse Metro plays a part in all of this. Metro's ridership projections are the basis behind the present NDP program, the convention center, freeway planning, etc. Metro will not help the transportation crisis, as presently conceived. WMATA and DOT refuse to deal with many actions which stem from Metro construction.

It is most significant that RLA not only relocates households and businesses dislocated by urban renewal but also those evicted by WMATA. Thus, the subway system has added to the relocation load of RLA for small businesses as well as families. At the same time the relocation authority eliminates potential relocation sites by demolition as preparation for disposition action calling for highrise construction which will have a cost per square foot prohibitively high for the existing small businesses. Is it any wonder that the small business community of the District is losing confidence in the appointed government of the District. WMATA is one of the agencies contributing to this crisis in confidence.

The subway authority has directly dislocated many small businesses, often through thoughtless, insensitive, harsh actions. For example, at a location adjacent to the Gallery Place Metro stop, WMATA is attempting to condemn buildings along the east side of 7th street, N.W. between G and H streets. WMATA staff reports regarding the costs of underpinning these buildings were submitted to the NCPC on August 9, 1972. In this report it was claimed that the cost of preserving the structures would be $320,000 more than demolition. The staff felt that this cost was unwarranted and consequently recommended demolition. The NCPC, however, disagreed and voted that the costs of preserving the structures were justified. Subsequently, the WMATA staff restudied the situation determining that the costs were about 1.5 million, not $320,000,

however, they presented many different sets of conflicting figures (see Appendix Q for a WMATA staff report and Ecology Center correspondence). As a consequence, the WMATA Board voted for condemnation of the structures. The Ecology Center feels that this action by WMATA was a shameful taking of private property. There must be a full investigation in the NEPA 102 statement of this incident.

Downtown small business interests are not the only small establishments impacted by WMATA. However, the Ecology Center's only involvement regarding small business displacment is in the Downtown and Cardoza. The bulk of our experience involves the Downtown where planning is in an advanced stage relative to most other stops. Recently WMATA hearings have been held regarding displacement of twelve businesses and one non-profit organization for construction of the U Street Station in Shaw. Additionally, a WMATA hearing was held on April 24, 1973 in Cardoza, where plans were set forth calling for the appropriation of at least 8 firms for construction of a section of tunnel.

The Metro subway system is an integral part of plans to redevelop the entire Downtown Core Area of the District by taking land from small businessmen and to do so at the expense of the inner city. The confidence of the small business community in the colonial government of the District has been shattered by the Metro/Urban Renewal process. They must fight for survival in a downtown core increasingly big business dominated. Every renewal action planned for downtown Metro areas will further eliminate sections of the downtown small business community, thereby forcing residents of the District to patronize the few remaining chains and department stores. Only the big chains will have the financial resources to remain in a downtown core of highrises. Indeed, it is the big business interests which make up the ranks of 'Downtown

Progress , the official citizen participation vehicle for the Downtown NDP. The National Capital Downtown Corporation (Downtown Progress) was formed by the financial elite of the city in 1960., Its membership is made up of large institutions which are tied to central city investments by the magnitude of their landholdings and by need for face-to-face contact of a downtown. These interests of monopoly seek to tighten up on their economic control of the central city core, to remove competition, to force all development potential away from the inner city into the downtown core by constructing Metro, freeways, by placing the downtown in urban renewal status and by 'redlining' areas outside of the downtown core as high risk areas. Downtown Progress is the vehicle of big money, and WMATA and RLA, its tools, never condemn the property of the fat cats. (see Appendix R)

According to housing critic Charles Abrams (City is the Frontier, 1965):

> "Over the years, the butcher, grocer, or druggist has developed a trade. Moving to another location means losing that trade, dismantling or sacrificing his stock, and starting all over again. He rarely gets part of that compensation in condemnation proceedings even if he has a valuable long-term lease, for most standard leases contain a waiver of the award or its assignment to the landlord. Nor dies it often do a storekeeper much good to be given a first call on a store in the new project. Since years elapse between his ouster and the completion of the project, the storekeeper must open up elsewhere, take a job, or join the army of the impoverished."

The only data available to the Washington Ecology Center dealing with relocation of businesses dislocated by Metro construction has been for the Downtown NDP Area. On December 30, 1971, Melvin Mister, Director of the RLA, testified before the City Council that of 68 businesses, 41 were relocated downtown, another 2 within the District, 9 were relocated outside of the District and 16 discontinued operation. This means that 47% of the small business establishments were lost to the District; this is a lower rate of

relocation success than the national average prior to the Uniform Relocation Act's passage. Furthermore, how many of the 41 businesses relocated downtown are presently in business? How many of them will have to be relocated again as a result of urban renewal or any other major city program? What percent of income must these establishments pay for rent before and after relocation? How many businesses were not recorded in the 68 figure named because they left of their own accord before RLA started paperwork on them? (RLA does not always tell businessmen their rights.) What is the effect of Metro construction on downtown volume of trade for small establishments adjacent to the construction?

Jackson Graham of WMATA has told committees of congress that a major construction project, such as Metro, must damage lives, that:

"You cannot make an omelet without breaking some eggs."

This is only an example of his and WMATA's cavalier treatment of the Washington Area community - a total disregard for human life, whether of residents, businessmen or workers.

According to Charles Abrams:

> "If 2,000 small esterprises in a single city were wiped out by a disaster, Congress would go into action. Yet not an eyelash is blinked when the disaster is planned under the name of public progress."
>
> Often the mere designation of a site is enough to frighten the residents into moving."

And so it is with Metro.........

COMMUNITY DISRUPTION AND DISLOCATION OF CITIZENS:

In light of the experiences of numerous communities of the metropolitan area it really takes a lot of gall for the consultants and DOT to claim that Metro is not disruptive of community values. The Washington Ecology Center can state quite surely that Metro has the clear potential of destroying every cohesive community that it now comes into contact with. The experiences of Takoma Park, Falkland, Brookland, Cardoza and many other areas bears out this danger. Therefore, the following claims of the consultants are misleading:

> "...over the long run. Metro service to many communities could mean an enhancement to some residential areas....Older residential communities like Takoma Park along the B route could profit from the stimulus provided by Metro service. Areas with more severe problems, such as Shaw which was affected by the 1968 riots, are expected to benefit substantially from rapid transit service and the development it generates..."

As emphasized in other sections of these comments, much of the dislocation impact of the WMATA system will be secondary rather than primary. While the consultants did a very good job in revealing the income ranges of families displaced by WMATA construction, we feel that this data is incomplete. There are no figures presented regarding the magnitude of the numbers of families which would be displaced by high density development and general 'upgrading of neighborhoods within the vicinity of subway stops. The latter secondary impact has, to date, received very little attention, even from area citizens, but we anticipate that this will change as subway construction progresses. The 'ripple effect' of the subway raising land prices in adjoining neighborhoods, is not necessarily socially beneficial. This may be a more subtle form of dislocation than outright redevelopment, but 'upgrading' of neighborhoods can have the effect of converting poor-moderate income stable communities into upper-middle class enclaves, witness Georgetown. This is certainly an

impact of the subway system. According to Congressman Larry Hogan of Maryland (Evening Star, June 23, 1972):

> "Metro (the subway system) will not only revolutionize life but it will create the biggest real estate boom we have ever seen."

While area jurisdictions might rejoice at the prospect of ridding themselves of the poor people, these individuals have the right to due process under the law just as the well-to-do. Furthermore, Congress is committed to providing a safe, sanitary home for every American. Upgrading of neighborhoods will probably serve to decrease the supply of poor-moderate income housing stock, while increasing the supply of upper-middle class structures. Assuming that demand for each will remain fairly constant this would mean that dwellings for the poor would cost more and those for the rich will cost less, relative to present market conditions. In this light Metro will contribute to a further redistribution of benefits from the poor to the rich. This is most assuredly an environmental impact of the subway system and DOT cannot sweep this problem under the carpet for local jurisdictions to deal with outside of NEPA. DOT must deal with the environmental impact of market externalities created as a result of the Metro subway system.

Moderate and low-income neighborhoods serve a social purpose within a social system, where the upper class gets rich off of defense spending and highway/subway construction while the people are underemployed and jobless. Human beings live in slums not because they necessarily want to but because they are poor. For Metro to trigger a chain of events which would lessen the number of dwelling units for the poor without creating any corresponding redistributive impact is criminal. To date the Ecology Center has seen no evidence of the beneficial impact Metro would have on the poor as a class. It pure and simple is being built for suburban needs, for developers and for

the downtown elite. In this atmosphere Metro was designed: To service a city with a downtown core of skyscrapers, an inner city eventually of luxury apartments, and a "balanced transportation system," of highways for the elite and a subway system for their suburban technocrats.

An example of just how WMATA might affect an inner city neighborhood is found in Cardoza, in Washington, D.C. The Cardoza area was the site of the 1968 "civil disorders." The commercial area of Cardoza along 14th Street was the site of a great deal of burning and looting. Many hundreds of businesses were destroyed. In the wake of the disorders, a series of weekly meetings were held between D.C. Government officials and representatives of the community, to discuss the rebuilding of the area. At first the D.C. Government was committed to a policy of simply replacing the former development with similar commercial, absentee-owned establishments. However, citizens of the area felt very strongly that they did not want to see a continuation of past commercial exploitation, which was a contributing factor to the urban explosion in the first place. They wanted to see development of the burnt-out areas that would serve the needs of the community.

One eventual product of these discussions was a clear sense of the boundaries of the community and this was to emerge as the 14th Street Neighborhood Development Area. Under the auspices of a foundation grant, the Committee to Rebuild Upper Cardoza and The Concerned Citizens of Central Cardoza secured funds to plan for the redevelopment of the 14th Street NDP area. First, a detailed survey of community values and needs was carried out. Two of the chief concerns of the residents were (1) to buy rather than rent housing and (2) for playgrounds. A first year action plan was drawn up which called for acquisition of key sites and for piggybacking of development opportunities,

This plan was very sound.

RLA accepted the NDP plan and acknowledged that it was sound planning. However, soon there was a severe cutback of funds by HUD. The entire program was then emasculated by RLA. In addition to cutting back funds, HUD forced RLA to make the burned-out areas first peiority, contrary to principles of sound planning and the concerns of the community.

The citizens went along with the revised plan despite strong reservations. They were told that the full comprehensive plan would be carried out in NDP's for the second and third action years. However, NDP #4 time came and RLA set forth a modified version of the citizen plan which would eliminate public use sites to be built under the piggybacking. RLA further planned code enforcement, not against the slum landlords owning multifamily dwellings as the community asked for, but, instead, against the 11% of the resident families that owned their homes. These families would be forced by RLA to assume average loans of $10,000, according to RLA figures, in order to meet code enforcment. Furthermore, RLA planned public housing, 90% of which would be too expensive for 85% of the residents to be relocated.

The 1963 explosions did not damage the residential areas of Cardoza, just the commercial establishments along 14th Street. Only since the 14th street area has been under Urban Renewal status has the residential community become seriously destabilized. In December of 1972 a lawsuit was filed by 14th Street residents claiming the RLA is responsible for this deterioration of the residential community due to its failure to insure that adequate levels of city services be maintained and by its failure to maintain RLA owned properties. It claimed that under the Uniform Relocation Act (24 CFR 42.55 a 2 & C 1), that RLA must be responsible for residents forced to move from the area as the

result of destabilization stemming from RLA negligence. The suit claimed that HUD, RLA and NCPC must comply with the National Environmental Policy Act.

Following the riots and, as Metro planning was underway, representatives of Cardoza community organizations sought to divert a Metro line from Georgia Avenue to 14th Street, in order to rejuvènate the inner city community. They did this after another line slated to travel through Cardoza was moved. The group succeeded in having the Georgia Avenue line moved over to the present subway alignment. Regarding the effect of this line upon the community, the representatives and the people of Cardoza were told that there would be no negative impact because all of the construction would be in tunnel. They were led to understand that the only impacts would be positive.

Enter WMATA in March of 1973 with one of the most destructive subway impacts yet. Plan modifications unveiled at this time, just prior to an April 24th hearing, called for the destruction of 60 homes and 8 businesses in Upper Cardoza, an action which would leave 78 families homeless according to WMATA figures. This destruction would result because the subway authority staff suddenly after four years decided that it would be dangerous to tunnel as planned and they claim that it would be too expensive to tunnel deeper. In the view of the people of Upper Cardoza, "the subway authority big-shots have declared war on the people of Upper Cardoza." (see appendix S).

The planned WMATA route would cut right through the heart of residential Upper Cardoza. All of these homes were scheduled for rehabilitation under the NDP #4 program. This rehabilitation program would already have forced a great hardship upon the homeowners who must take on large loans to meet code enforcement standards. Nevertheless, the WMATA plan would devastate the area despite the fact that NDP plans call for increased home ownership in Cardoza.

Until about March of 1973, WMATA claimed that the subway alignment would not damage any homes, that they would tunnel under the homes. Then came the revised plan which hit the community like a bombshell!

How can WMATA justify leaving up to 400 people homeless, destroying the only remaining stable community in Cardoza. This action disregards all humanity. It flies in the face of all plans of the city government, NCPC and even President Nixon. Many of us wonder, however, whether this is a case of lack of coordination between WMATA and RLA or whether it is a blatant attempt to destroy black families and to remove them to the suburbs. Is this, also, necessary to make WMATA work? Will the subway ultimately bring total destruction to another stable area?

Planners! How can you justify this destruction? At the hearing of April 24th, WMATA staff members revealed that they had not even discussed this matter with the NCPC, the urban renewal planning authority, nor with the RLA, the implementing agency. This action will add about 50% more dislocated families to the number given in the environment report for the entire Greenbelt line of twelve stops. The fact that WMATA will dislocate 75% poor families and 20% moderate-income families, on a regional basis, gives a pretty good picture of upon whom the social impact of the subway will fall (we will never forget Jackson Graham stating before Congress that a few eggs will have to be broken to make an omelet).

Not only did WMATA fail to coordinate this action in Upper Cardoza with appropriate government bodies, but it failed to present alternative alignments at the hearing as well as relocation data. Is it sound policy to plan for dislocation without investigating whether relocation is possible? Is it sound planning to stir up a community with destabilizing plans and then, in the

face of total community opposition to say that these plans were just thrown out to see how the people would react and 'we'll see what we can do now.' The specter of WMATA will now hang heavily over Upper Cardoza and it will not bring prospects of prosperity, at least to many of the present residents. In this sense this plan and plans like it can become self-fulfilling prophecies. Such plans hang over areas as potential threats, the community destabilizes as a result, residents get tired of fighting, they move (without RLA relocation benefits), banks refuse to make loans, a cycle starts and then it may be too late.

AIR QUALITY CONSIDERATIONS AND TRAFFIC IMPACT:

The District of Columbia and Metropolitan Council of Governments Implementation Plans for the meeting of the requirements of the Clean Air Act of 1970, call for a reduction of 25% in auto commuters with the downtown core as a destination. Mass transit must serve as the alternative mode of transportation for many of these 90,000 commuters. The goal of the area mass transit systems should be to move existing commuters by non-auto means, not to accommodate additional commuters generated by new development created by the subway stop. Moreover, since many measures called for in the Implementation Plan are either untrustworthy or untested strategies, it is likely that there will have to be a further reduction in downtown core commuters over the 90,000 figure. Some of these questionable strategies include: retrofitting of pre-emission control cars; night-time truck delivery; traffic-free-zones; car pool locater service and vehicle inspection/maintenance. If any of these measures are unacceptable and/or unworkable, auto traffic to the downtown will have to be further curtailed. In this event mass transit will have to take up the slack, not only of downtown core traffic but, also, of cross-county traffic where the highest concentration of regional vehicle miles are traveled. The subway system, of course, will do little to alleviate cross-county air quality problems, although Metro-stop-generated-development and feeder traffic will serve to worsen local suburban air quality.

While there is every indication that Metro will have to take on more than 25% of present downtown core auto commuters, WMATA is putting out ridership projections which call for a 40% increase in downtown employment. This means that while there would be an increase in transit trips there would still be an absolute increase in auto trips. Furthermore, the consultants were unable to demonstrate that Metro will relieve area traffic congestion and cause a

corresponding decrease in air pollution readings. This is because the consultants could offer the public no proof that auto users diverted onto transit will not be replaced by new auto users traveling to development generated by Metro. In the event of the continued pursuit on either a local or an areawide basis of using Metro as an economic development scheme, at the wrong locations, Metro will cause further degradation of the area environment. It is conceivable that Metro will cause an increase in areawide transit usage but, nevertheless, contribute to an areawide increase in total auto usage.

The downtown development for the five urban renewal action sites will generate 4-5,000 new automobiles (assuming a 58% transit modal split). A Convention Center complex being built in the Downtown Urban Renewal Area (DURA) will not only have a great number of parking spaces but will, additionally, create additional parking spaces through the generation of development of the areas adjoining the facility. According to a document on a proposed Convention Center/Sports Arena Complex published in July, 1971 the joint facility would have these parking facilities:

> "The underground garages within the facility could provide 7,400 spaces by utilizing three levels of parking beneath the complex. Further studies may indicate that this amount of parking is not required to serve the multi-uses within the facility. However, it should be noted that this parking could be used by commuters during the off-peak hours of the convention hall and sports arena. Thus the underground garages would also serve as fringe parking facilities at the edge of the central retail section of Downtown for those transferring to the mini-bus or Metro."

Under the NCPC studies highest intensity development alternative for the area adjoining the Convention Center and the Metro stop:

> "Hotels and offices would reach 130 feet in height, and would provide about 1.5 million square feet of office space; 2,400 hotel rooms; 243,000 square feet of ground-floor commercial space. Employment would total 9,000."

Although plans to include a Sports Arena have been dropped from the package plans are far advanced for the Convention Center. In addition, plans have now been advanced for an International Cultural and Trade Center Complex to be situated on the land which the Sports Arena would have occupied. According to the group which is proposing this facility:

> "Ample underground parking would be provided at the ICIC site, and in addition joint use of both the ICTC and the Eisenhower Center parking facilities could be provided."

According to a study of downtown parking needs by DeLeuw, Cather and Associates and Harry Weese, there will be demand for thousands of additional off-street parking spaces by 1985, just a few years after Metro is completed (these are two of WMATA's prime consultants):

> "A 1969 survey prepared for the National Capital Planning Commission revealed that in 1968 there were over 56,800 off-street parking spaces in the area (between 2nd street, N.E. on the east, 23rd street N.W. on the west, Constitution Avenue on the south, and Massachusetts Avenue on the north. (82.00) There were approximately 5,000 on-street spaces in this same area."

> "The number of off-street spaces had increased approximately one-third since 1960. There had been a dramatic increase in the number of spaces in parking garages during the same period. The total number of garage spaces had approximately doubled - - to 30,000 spaces - - by 1968. The number of spaces in lots had remained relatively constant."

> "Using data furnished principally by the National Capital Planning Commission the consultants on the parking study indicated that there would be a demand in Downtown Washington for an additional 65,000 parking spaces by 1985. (82.00) This additional need was projected for a much larger area than that covered in the parking survey. Projections assumed that the basic subway system would be in service; that surface parking lots would be eliminated by 1975; and that parking space in new residential and office buildings would be required by code."

The conclusion of the Washington Ecology Center after having studied the Metro system for some time is that Metro is part of an entire trend towards additional rather than fewer parking spaces. This has been discussed in more detail in the sections on Downtown Urban Renewal and on land use.

According to Morton Hoffman and Company in a study for RLA entitled <u>Development Alternatives for the Downtown Urban Renewal Area</u>:

> "A number of factors will influence the tempo of new office space development in DURA, including:
>
> "(4) The availability of off-street parking. Although Metro will allay congestion partially, street traffic volumes will continue to increase, with augmented visitor and convention traffic as well as possible Bicentennial activities. A parking authority is crucial to provide an adequate supply of parking."

The Ecology Center believes that all evidence points in the direction of Metro contributing to the degradation of the environment rather than the air quality savior that the consultants paint the subway as. Unless very different public policy decisions are made regarding the use of land adjoining Metro stops the city of Washington will have a Convention Center, a International Cultural and Trade Center, Downtown Skyscrapers, a parking authority building decked parking structures, freeways and a worsening air quality problem.

To turn to the areas outside of the downtown, Metro is also serving as a force creating further degradation of air quality. In Takoma Park, Maryland plans were unleashed by the Montgomery Planning Board in 1971 calling for the widening of 6 roads to 5-6 lane divided highways (see Appendix K), as part of an amended sector plan package dealing with "transit impact planning." The plan called for development around the Metro stop and it would have generated 3-5,000 commuters and residents, a number of whom would have driven automobiles. As a result of angry opposition to this plan from Takoma Park citizens it was dropped and to date no final revised plan has been released by the Planning Board, although some members of the Board still speek in terms of intensive development of the "Metro Impact Area." A preliminary plan which the Board held hearings on called for a permissive transit impact zone, a "wait and see

approach" in regard to road widenings and the construction of a 1,100 car parking garage across the street from an apartment complex for the elderly. The Planning Board to date refuses to make the Clean Air Act of 1970 part of the planning process (see Appendix L for correspondence).

In Prince George's County there are a good deal of development pressures around the Landover and New Carrollton Metro stations. These pressures will have a rather severe air quality impact. The following excerpt from an unidentified flyer distributed in Prince George's County sets forth what the Ecology Center perceives as a problem:

> "The construction of East-West Highway and of the Interchange at Route 50 (John Hanson Highway) and East-West Highway is needed to give better access to the Metroliner station, and to the New Carrolton and Landover Metro stations which will be in use by late 1975, just before the Bicentennial."

> "This Interchange and these roads are needed to handle the growth of the Ardwick Indistrial District and to relieve the present congestion."

One of the most serious indictments against both WMATA and the Montgomery County Planning Board can be made regarding the Silver Spring stop. This stop was placed 1/2 mile from the Central Business District of Silver Spring. It was located adjacent to the Falkland Garden Apartment Development. This is a shocking example of poor planning which cannot be explained away. The stop could have served to act as a rejuvenating force to the Silver Spring CBD. This area is in a state of decline as indicated by a 20% vacency rate in office space; redevelopment potential of a subway stop would therefore have been a shot in the arm for the area. However, the stop was instead placed adjacent to Falkland, a moderate-low-income apartment complex, in a wooded setting, with about 4-5,000 units. Falkland, which is in every sense a stable community, is also fiscally sound, yelding a profit of over $348,000 a year,

after taxes, maintenance and operating costs. The contemplated project calls for the construction of 125,000 square feet of retail space, 1,200,000 feet of office space, 2,000 apartments (3/4 of them luxury), a 400 room motel and parking for 5,000 cars. A development of this scale and scope would create an air pollution and traffic crisis for the area. According to the State Roads Commission, in a letter dated January 13, 1970:

> "If we were to design appropriate facilities to handle our traffic, the proposed development (Falkland), and possibly the traffic that would be generated by the Rapid Transit Station, not only would the cost be prohibitive, but the required Right-of-Way and Design would make the development unfeasible."

According to the Montgomery County Project on Low and Moderate Income Housing, this letter was written while the State was still committed to construction of the North Central Freeway which would have linked Silver Spring to the downtown core of the District. Certainly the traffic movement problems are now compounded due to the fact that the State is no longer planning to build I-70S. The Emergency Committee on the Transportation Crisis has charged that the Falkland development project and the high density development planned at Metro stops all along the Glenmont subway corridor is being used as a means to generate additional traffic in the hope that it will create more pressure for construction of the freeway. (for more information on Falkland see Appendix M)

The Frienship Heights Metro stop area of Northwest Washington, D.C. on the D.C.-Maryland line, is also the site of extensive development pressures. Plan of investors for the area would according to the D.C. Highway department double the present auto traffic levels and overwhelm the area road system. Notice of a citizen lawsuit under the authority of the Clean Air Act of 1970 has been issued to the Montgomery County Council and Planning Board. (see Appendix N)

A great number of parking spaces, as well as high intensity development, is being planned for the station stop areas of the District along the Glenmont line. This is being done despite the concerns of Upper Northeast citizen associations including the Northeast Coordinating Council, the Brookland Civic Association and the D.C. Federation of Civic Associations. These organizations are all disturbed about the additional traffic which would result from the planned development. Additionally, the D.C. Mayor's Office of Planning and Management has asked that few parking spaces be provided at these stops; however, WMATA has ignored this concern. Four stations along the Glenmont line were, as of 1972, scheduled to have 2,300 parking spaces - half of the 4,650 proposed for all District stops. The four were — Rhode Island Avenue, Michigan Avenue, Fort Totten and Takoma Park. The parking spaces planned for these stops will have a minimal impact upon Metro transit ridership (4-10% of all peak-hour riders) however, these parking spaces will have a rather severe impact upon localized traffic patterns. The impact of the Takoma Park station plan, where work is most advanced, has already been discussed. It is expected that Fort Totten and Michigan Avenue stops will receive the bulk of development. Arthur Hatton, Director of the District Zonning Commission, at a hearing on the Takoma Metro stop reported that the greatest development is contemplated to occur at the "Turkey Thicket Stop" (Michigan Avenue). Additionally, Fort Totten is classified as an 'uptown center.'

Parking planned for other District stops includes 500 spaces for the Dean Avenue Station, Oklahoma Avenue (1,000), Tenley Circle (350) and Alabama Avenue (500). For all of the mentioned Metro stops parking lots are not necessary to make the subway work. Emergency Committee on the Transportation Crisis is of

the opinion that the reason why WMATA is planning these unnecessary lots is (1) to generate traffic to pacify the highway lobby and (2) because of the potential bonanza of air rights construction over the parking lot or reconversion of the parking lot; either of which would provide profits to WMATA which is already one of the largest landholders in the District of Columbia.

The entire question of the Metro system contributing to substantial degradation of the air quality and physical environments of the areas adjoining Metro stops was not dealt with in the Environmental Statement, despite the insistence of the Washington Ecology Center and other citizen organizations that WMATA specifically call for such analysis in the contract issued to the consultants. Did DOT also approve of the superficial contract prior to its issuance? The Ecology Center has taken the time to go through the sad and repetitious stories of what is happening around the stops only because WMATA and DOT did not do so.

There is every reason to believe that the air quality and transportation impact of the Metro system will be negative. The subway/metrobus system according to the modal split projections of WMATA will only increase downtown core transit ridership by 20-30%. This is a very slight increase in light of the magnitude of expenditures involved, for this largest public works project in world history. This subway induced increase in transit ridership is so minimal that even as rudimentry a measure as a $2-3. parking tax would bring a comparable (20%) increase in transit ridership, according to figures of the Council of Governments which even assumed the existence of the present poor level of bus service.

To summarize the Ecology Center feels that the consultants do not make

even a minimal case for the subway system. The transportation data presented does not substantiate claims regarding need for the proposed mass transit system. The cost/benefit analysis does not compare the Metro system's alleged benefits to those which would be engendered by a number of possible alternatives. Furthermore, the cost/benefit analysis does not deal with secondary impacts of the Metro system, including land use impact, disruption of traffic patterns destruction of cohesive neighborhoods, auto congestion induced by the system and impacting of the air quality of both the local station areas as well as the region as a whole.

WORKERS AND PEDESTRIANS:

Very little is said in the NEPA statement regarding what measures are being taken concerning the safety provisions for workers and pedestrians. To date, the WMATA safety record is very poor. Many workers have met with accidents; workers have even died. There are many hazards to pedestrians; for example, along Connecticut Avenue construction, open pits have been exposed directly beside the sidewalk with only a thin string as a barrier between the pedestrian and the pit. We have no way of knowing what the accident rate is for WMATA, but certainly the NEPA statement should contain figures on this question as well as information regarding how past mistakes will be avoided in the future.

According to Businessmen Affected Severely by the Yearly Action Plans (BASYAP), WMATA construction is a great hazard to shoppers and workers. In a letter of May 26, 1971 to John Volpe, Secretary of Transportation, James Muscatello, a small businessman impacted by Metro construction wrote of some of the WMATA safety problems:

> "We believe that pedestrians and workers are in grave danger of slipping into holes, and being hurt by the equipment due to the lack of acceptable standards of safety on the job at this construction site."
>
> "Pedestrians are not being afforded proper and safe access to the business establishments - and this goes for deliveries and fire-fighting equipment."
>
> "In other words, the Master agreement between WMATA and the D.C. Government is being largely ignored. That agreement, as testified to by the D.C. Highway Department at hearings held by the D.C. City Council on May 13, 1971 provides that:
>
> > 'Access to business establishments: In the operation of the Authority's Contractor, special consideration shall be given to the necessity of providing access to business establishments for pedestrians, deliveries and fire-fighting equipment.'

From a letter to President Nixon written by Mr. George Frain, Executive Secretary of BASYAP (June 28, 1971):

> "Mr. President, the businessmen in the Metro impact area are prepared to go to court to have the Health and Safety Regulations (see Federal Register, April 17, 1971) enforced, since the Secretary of Labor, James D. Hodgson has not enforced these regulations himself even though he is charged with doing so. There have been accidents on the job. We are told that just last week a workman had his leg broken. Earlier a relative of Rep. Gilbert Gude (R-Md.) was hurt. And on June 17, 1971, the Beef-Feeder's Restaurant was swept by fire which, according to reports, was caused by a welding torch wielded by an employee of a Metro contractor."

The Ecology Center trusts that the final 102 statement will contain information on all past accidents involving Metro construction (by type) as well as details regarding future safety measures.

RESPONSE TO COMMENTS OF THE WASHINGTON
ECOLOGY CENTER (keyed to pages of letter)

1. Applicability of NEPA to WMATA (pages 1-5)

In Saunders et al vs. WMATA, September 1973, the U.S. Court of Appeals for the D.C. District held as follows: "We do not think it required that the Board prepare a formal environmental impact statement as mandated for 'major Federal actions' by Section 102 of the National Environmental Policy Act, 42 U.S.C.S. 4332 (1970)." Environmental studies for the system and for individual routes are, nevertheless, prepared to meet the substantive requirements of NEPA and CEQ guidelines and the system study was circulated in accordance with NEPA and CEQ procedural requirements.

2. Public Policy (page 5)

Section 4 of this study as revised, Alternatives to the Proposed Action, presents an account of the process of formulating and establishing public policy with regard to WMATA, including public hearings, and referenda held on the system in the five major jurisdictions affected by the system.

3. Relocation Provisions (pages 5 and 6)

WMATA relocation policies are discussed in the Social and Economic Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment. Specific areas in which a Metro route is located in or near an area in which there has in the past been relocations as a result of renewal are identified as potential local areas of critical concern in Section 2 of Part II of this Report, the Critical Areas Study.

4. Bus System (pages 7-12)

A discussion of the Metro bus system is presented under Metro System Characteristics in Appendix D, Part III of this Report as revised. A summary discussion of Metro characteristics is presented in Section 1 of this Report, Description of the Proposed Action and Its Purposes.

5. Bus Service as an Alternative to Rapid Transit (pages 7-12)

Bus Service as an alternative to Rapid Transit is discussed in Section 4 of this report as revised, Alternatives to the Proposed Action.

6. Commuter Railroad; Airlie Alternative C (page 10)

Additional discussion of Airlie Alternative C is presented in Section 4 of this report as revised, Alternatives to the Proposed Action.

7. Revised Ridership Projections (pages 13-16)

Revised ridership projections based upon the current draft revised Net Income Analysis (July, 1974) have been incorporated on page vi; paragraph 3-1, and page 16c.

8. Conformance to Air Quality Implementation Plans (page 15)

Conformance to Air Quality Implementation Plans is discussed in the Natural and Ecological Impacts subsection of Section 2 of this report as revised, The Probable Impact of the Proposed Action on the Environment, and in Appendix H in Part 3.

9. Land Use Implications of Metro (pages 17-20)

The relationship of the Metro rapid transit system to regional land use patterns and plans is discussed under the Social and Economic Impacts subsection of Section 2 of this study as revised, The Probable Impact of the Proposed Action on the Environment. Specific potential local impacts of Metro are identified in Section 2 of Part II of this Report as revised, the Critical Areas Study.

10. WMATA Policies Regarding the Disposition of Acquired Land (pages 22-35)

WMATA policies regarding the disposition of acquired land are discussed in the Social and Economic Impacts subsection of Section 2 of Part 1 of this report as revised, under Land Use and Future Development.

11. Station Location Policy (pages 36-43)

WMATA station location policy is discussed under Considerations in Arriving at the Present System in Section 4 of this report as revised, Alternatives to the Proposed Action.

12. Potential Community Disruption (pages 44-50)

Potential disruptions of neighborhoods or communities by Metro lines or stations are identified in Sections 1 and 2 of Part II of this Report as revised, Route Summaries and the Critical Area Study respectively.

13. Metro Station Impacts, Land Use and Local Traffic Patterns and Air Quality (pages 51-59)

Potential Metro station impacts upon adjacent land uses and local traffic patterns and air quality are identified in Sections 1 and 2 of Part II of this Report, Route Summaries and the Critical Areas Study. Detailed analyses of such impacts are presented in Route Environmental Statements available from WMATA for review. Regional air quality impacts are discussed in Appendix H, Part III of this Report. Summaries of these impact analyses are presented in Section 2 of Part I of this Report under Natural and Ecological Impacts.

14. Safety During Metro Construction and During Metro Operation (pages 60 and 61)

Safety During Metro Construction and Metro Operation are discussed briefly under Metro System Characteristics in Section 1 of this Report as revised, Description of the Proposed Action and its Purposes and in detail in Appendix D, Part III, of this Report, Details of Metro Characteristics.

ATTACHMENT I

DESCRIPTION OF CONSTRUCTION CONTRACTS

Construction of the Sections of the Metro System described as follows:

Section A-6b: The running tunnels of Section A-6 were constructed under a previous contract. This contract provides for the construction of the Zoological Park, Cleveland Park and Van Ness Stations and includes:

a. 425 linear feet of cut-and-cover double box structure.
b. Three station entrances.
c. Facilities for the handicapped.
d. An underground combination substation and chiller plant.
e. Six vent shafts.
f. One fan shaft.
g. One pumping station.
h. One kiss'n'ride facility.
i. Restoration of Rock Creek Park in the portal areas.

Section G-1 : Section G-1 begins at a point near the intersection of Benning Road and 36th Street, N.E. and extends to the intersection of Benning Road and 45th Street, N.E. in the District of Columbia. This 5,790 linear foot section includes:

a. 550 linear feet of retained earth cut.
b. 500 linear feet of two single track cut-and-cover box structures.
c. 3,800 linear feet of two single track earth tunnels.
d. The Benning Road Station with a center platform, single entrance and facilities for the handicapped.
e. Ventilation structures in the form of one vent shaft and emergency access, one combination fan shaft and emergency access.
f. One underground pumping station.
g. One surface traction power substation.
h. One underground electrical tie breaker station.
i. A chilled water plant for station air-conditioning.

Section G-2: Section G-2 begins at a point near the intersection of Benning Road and 45th Street, N.E. in the District of Columbia and extends to a point approximately 600 feet east of the intersection of East Capitol Street and Southern Avenue in Prince George's County, Maryland. This 7,675 linear foot section includes:

a. 6855 linear feet of two single track earth tunnels.
b. The Capitol Heights Station with a center platform, single entrance and facilities for the handicapped.
c. One subsurface traction power substation.
d. One combination fan shaft and emergency access structure.
e. One combination fan shaft and tie breaker station and emergency access structure.
f. Two vent shafts.
g. One combination substation and chilled water plant.

Section A-13: Section A-13 begins at a point just south of the intersection of Wisconsin Avenue and I-495, and extends to approximately 500 feet south of the intersection of Strathmore Avenue and Rockville Pike in Montgomery County, Maryland. This 6,480 linear foot section includes:

a. 3,030 linear feet of double track aerial structure.
b. 950 linear feet of double track embankment.
c. 750 linear feet of at-grade construction.
d. 70 linear feet of cut-and-cover double box structure.
e. 1,080 linear feet of cut-and-cover triple box structure.
f. One underground traction power substation.
g. The Grosvenor Station with center platform, single entrance and facilities for handicapped.
h. A 500 car parking lot with kiss'n'ride facility.

Section G-3 : Section G-3 begins at a point near the intersection of East Capitol Street and Davis Street, and extends approximately 1000 feet east of the intersection of Central Avenue and Cabin Branch Road, in Prince George's County, Maryland. This 6,219 linear foot section includes:

a. 3,985 linear feet of two single track earth tunnels.
b. 368 linear feet of cut-and-cover double cross-over structure.
c. A ventilation structure in the form of a combination fan shaft and emergency exit.
d. The Addison Road Station is an at-grade station with a center platform, a single entrance at the west end and includes facilities for the handicapped. Because of topography, the entrance to the mezzanine level is also at grade. Passengers descend to the platform by escalators, or the elevator for the handicapped, at the east end of the mezzanine. Total length is 767 LF.
e. One electrical substation.
f. 557 linear feet of two single track aerial structures.
g. 542 linear feet of at-grade track.

Section L-1 : Section L-1 begins at a point near the intersection of 9th Street and Maine Avenue in southwest Washington, D.C., and extends in a southwesterly direction to a point near Ohio Drive in East Potomac Park. This 3,263 linear foot section includes:

a. 2,061 linear feet of cut-and-cover box.
b. 1,020 linear feet of sunken tube.
c. 90 linear feet of retained cut.
d. 92 linear feet of retained fill.
e. A temporary marina for 77 boats to replace facilities of the Capitol Yacht Club which must be displaced to permit construction of this section.
f. Relocation of a 72-inch and a 90-inch sewer.

Section FF-1b: Section FF-1b is the finish contract for Section F-1b including the Archives Station. Section FF-1b begins at a point near the intersection of 7th Street and F Street, N.W. and extends to a point near the intersection of 7th Street and C Street in southwest Washington, D.C. This 3,900 linear foot section includes:

a. Installation of mechanical equipment for heating, ventilation and air-conditioning.
b. Installation of electrical equipment including switchgear and transformers.
c. Lighting installation.
d. Architectural finishes for the Archives Station.
e. Restoration of surface areas near the station entrance.

Section K-4b: Section K-4b begins at a point near the intersection of Fairfax Drive and George Mason Drive, and extends to a point near Fairfax Drive approximately half-way between North Harrison and North Frederick Streets in Arlington County, Virginia. This 1,990 linear foot section includes:

a. 1,990 linear feet of cut-and-cover double box structure.
b. One electrical substation.

Graphics 3: Graphics (GR-3) provides graphics for nine stations for operating Phases IIA and III. The four stations for Phase IIA operations are: Brookland, Fort Totten (Route B), Takoma and Silver Spring. The five stations for Phase III operations are: Minnesota Avenue, Deanwood, Cheverly, Landover and New Carrollton. This contract provides:

a. Porcelain enamel graphics pylons.
b. Bronze identification pylons for entrances to stations.
c. Parking-lot signs.
d. Service-room-area graphics (room identification and exit signs).

Trackwork-4 : Trackwork-4 consists of approximately 10.8 miles of main tracks and secondary tracks, including contact rails and necessary appurtenances, for Phase IV operation of the Metro System. The limit of work comprises the following approximate lengths of transit line:

a.	Rockville Route	- Station 111+86 to 221+00 Section A-6	2.1 miles
b.	Greenbelt Route	- Station 0+00 to 4+97 Sections E-1 and E-2	0.1 miles
c.	Branch Route	- Station 0+00 to 168+00 Sections F-1 and F-2	3.2 miles
d.	L'Enfant-Pentagon Route	- Station 52+31 to 156+55 and Station 247+74 to 252+51 Sections L-1 and L-2	2.0 miles 0.1 miles
e.	Vienna Route	- Station 150+00 to 322+00 Sections K-1, K-2, K-3, K-4, K-4a and K-4b	3.3 miles

Section C-10a: Section C-10a begins at a point just south of Braddock Road on the east side of the Richmond, Fredericksburg and Potomac Railroad, and follows the railroad operating right-of-way generally southwestward to a point south of the intersection of King Street and Dangerfield Road, Alexandria, Virginia. This 3,148 linear foot section includes:

a. 2,306 linear feet of at-grade and embankment construction with 2,616 feet of retaining walls.
b. 842 linear feet of aerial structure, including the station.
c. The above-grade King Street Station, with a center platform, an at-grade mezzanine, ancillary equipment, facilities for the handicapped, bus stalls and kiss'n'ride parking area.
d. One at-grade electrical tie breaker room in the abutment north of Commonwealth Avenue.

Section C-10c: Section C-10c begins at a point near the intersection of Huntington Avenue and Fenwick Road in Fairfax County and extends to a point near the intersection of North Kings Highway and Farmington Drive, also in Fairfax County. This 1,470 linear foot section includes:

a. The at-grade center platform Huntington Station with two entrances and facilities for the handicapped.
b. One three level parking structure for 792 cars.
c. 865 linear feet of earth tunnel construction.
d. One fan shaft.

Section J-1 : Section J-1 begins at a point near the intersection of Mill Road and Roberts Lane and extends to a point approximately 1,735 feet west of the intersection of Quaker Lane and the Southern Railway tracks in Alexandria, Virginia. This 6,500 linear foot section includes:

a. 695 linear feet of single track aerial construction.
b. 1,043 linear feet of single track retained fill.
c. 1,738 linear feet of single track surface construction.
d. 4,762 linear feet of double track surface construction.
e. One two-story traction power substation.
f. Two surface electrical tie breaker stations.
g. One tie breaker station with a train control room.
h. 9,261 linear feet of single track (yard lead track) on embankment.

Section C-11c: Section C-11c is the first phase excavation and grading contract for the Alexandria Service and Inspection Yard which is to serve the Huntington and Springfield Routes. It is located in Alexandria, Virginia, and is bounded on the north by Southern Railway, on the south by Capital Beltway I-495, on the east by Telegraph Road and on the west by Linean Street. It includes:

a. Excavation of 337,000 cubic yards for the relocation of approximately 3,200 linear feet of the Cameron Run channel to a new alignment just north of and parallel with I-495 to permit relocation of the Holmes Run trunk sewer and construction of the yard.

Section C-llc: Con't

b. Rough grading of the 30 acre yard site and the proposed Eisenhower Avenue right-of-way.
c. Installation of 1,320 linear feet of storm drains and culverts.
d. Relocation of 5,000 linear feet of the Holmes Run sanitary-trunk-sewer into the right-of-way of the proposed Eisenhower Avenue to permit the relocation of Cameron Run and the construction of the yard.
e. Relocation of 1,600 linear feet of 34.5 KVA power lines.
f. Relocation of 3,160 linear feet of high pressure gas main.

Escalators-5: Escalators-5 (ESC-5) provides for the procurement and installation of 78 escalators in stations which are in Metro Phases III and IV. This procurement would provide the surface-to-mezzanine and mezzanine-to-platform escalators to complete Metro Phase III and selected stations in Metro Phase IV.

Escalator contracts are designed to be closely compatible with the construction schedule, since the escalators cannot be installed until the construction performed by the prime contractor has advanced to the point where he can allow the escalator contractor to work in the escalator wellway, without undue interference with his own work.

Section C-llb: Section C-llb consists of the Service and Inspection Shop structure located in the Huntington Route Service and Inspection Yard. This section includes:

a. Approximately 71,000 square foot shop building.
b. Equipment for maintenance such as truck and body hoists, wheel truing machine and turntables.
c. Yard control center.
d. Utilities and necessary appurtenances.

Section E-l : Section E-l begins at a point at the intersection of 7th Street and H Street, N.W. and extends to a point near the intersection of 7th Street and Q Street, N.W. in the District of Columbia. This 4,313 linear foot section includes:

a. 3,351 linear feet of two single track earth tunnels.
b. The Federal City College Station with a center platform, single entrance and facilities for the handicapped.
c. Ventilation structures in the form of one vent shaft, one combination vent shaft and emergency access, one combination fan shaft and underground pumping station, and one fan shaft.
d. A combination underground electric substation and chilled water plant for air-conditioning of Federal City College and Shaw Stations.

Section FF-la: Section FF-la is the finish contract for the lower level of Gallery Place Station, which is located under 7th Street, N.W., from F Street to H Street, in Washington, D.C. This contract provides for all finish work at this Station to include:

a. Architectural finishes, mechanical equipment, air-conditioning and ventilating equipment, and electrical equipment and lighting.

Communications-4: Communications-4 (COMM-4) consists of communication system elements needed to serve all sections comprising Phase IV of the Metro System. These elements are integral to and expand upon the communications facilities contained in Phases I, II, IIA and III. COMM-4 will include:

a. Cable Transmission System facilities to provide 120 full duplex voice and data quality channels from OCCB to the Phase IV sections.
b. PABX and Wayside telephone facilities to provide 300 telephone stations.
c. Mobile Radio facilities to extend system coverage throughout the Phase IV sections.
d. Closed Circuit Television facilities comprised of 80 cameras, 120 monitors and all associated video amplifiers, coaxial cable and switching equipment.
e. Public Address facilities to serve each passenger station, utilizing approximately 80 audio amplifiers, 2000 PA speakers and all associated cable.
f. Fire and Intrusion detection facilities to serve all passenger stations, ancillary buildings and vent shafts.
g. Supervisory Alarm facilities to monitor the operation and status of all communications systems.
h. Teletype communication facilities to provide all record communications incident to rail operation.
i. The above facilities, to provide service for 8 passenger stations and 21.66 miles of track system will require the installation of approximately 400,000 linear feet of multipair and coaxial cable.

Section C-9 : Section C-9 begins at a point just south of the Four Mile Run channel and west of George Washington Memorial Parkway and generally parallels the east side of the Richmond, Fredericksburg and Potomac Railroad operating right-of-way as it extends southward to a point near the intersection of Braddock Road and West Street, Alexandria, Virginia. This 10,921 linear foot section includes:

a. 4,930 linear feet of at-grade and embankment construction with 2,500 linear feet of retaining walls.

Section C-9 : Con't

b. 913 linear feet of retained earth cut.
c. 2,438 linear feet of retained earth fill, including the station.
d. 2,450 linear feet of double box cut-and-cover structure.
e. 190 linear feet of bridge structure over Braddock Road.
f. The above-grade Braddock Road Station with a center platform, an at-grade mezzanine, ancillary equipment, facilities for the handicapped, bus stalls and kiss'n'ride parking area.
g. A ventilation structure in the form of one fan shaft for the cut and cover section.
h. One underground pumping station.
i. One two-story traction power substation with one story above grade.
j. One single story at-grade traction power substation.
k. One at-grade electrical tie breaker station.
l. Relocation of 9,940 linear feet of RF&P Railroad operating tracks.

Section C-10b: Section C-10b begins at a point near the intersection of King Street and Dangerfield Road in Alexandria and extends along the Huntington Route to a point near the intersection of Huntington Avenue and Fenwick Road in Fairfax County. Section C-10b also extends along the Springfield Route to a point near Mill Road and Roberts Lane in Alexandria. This 8,817 linear foot section includes:

a. The aerial side/platform Eisenhower Avenue station with a single entrance and facilities for the handicapped.
b. Two surface traction power substations.
c. One surface tiebreaker station.
d. One drainage pumping station.
e. One ventilation fan shaft.
f. 1,850 linear feet of retained cut single track construction.
g. 1,200 linear feet of single track surface construction.
h. 3,880 linear feet of single box cut-and-cover construction.
i. 380 linear feet of double box cut-and-cover construction.
j. 240 linear feet of double track surface construction.
k. 650 linear feet of retained fill double track construction.
l. 2,360 linear feet of double track aerial structure.
m. 4,520 linear feet of single track aerial structure.
n. One underground train control room.
o. 40 linear feet of retained cut double track construction.

Section E-1b: Section E-1b begins at a point near the intersection of 7th Street and Q Street, N.W. and extends to a point near the intersection of Vermont Avenue and U Street, N.W. in the District of Columbia. This 2,687 linear foot section includes:

a. 1,490 linear feet of two single track earth tunnels.
b. The Shaw Station with a center platform, two entrances, and facilities for the handicapped.

Section E-1b: Con't

c. Ventilation structures in the form of two vent shafts and one fan shaft.
d. One cut-and-cover #8 double crossover structure.

Section C-11: Section C-11 is the second phase construction contract for the Alexandria Service and Inspection Yard which will serve both the Huntington and the Springfield Routes. With a Metro car storage capacity of 116 cars and future accommodations for an additional 16 cars, the main functions of the yard will include storage of Metro cars during off-peak hours, minor repairs and servicing of cars, interior and exterior cleaning of cars, and scheduled inspection of cars. The site, approximately 30 acres, is located about 2,100 feet west of Telegraph Road in Alexandria, Virginia. It is bounded on the north by the proposed Springfield Route Section J-1, which is parallel to the Southern Railway, and on the south by the proposed Eisenhower Avenue and the Capital Beltway, I-495. This contract includes:

a. Yard Operations Building (8,130 square feet).
b. Car interior cleaning platforms.
c. One traction power substation building (4,720 square feet).
d. One train control equipment room (600 square feet) to be built as an appendix to the traction power substation building.
e. One access road bridge.
f. 3,400 linear feet of access and service roads.
g. Parking areas for 90 employee and Authority vehicles.
h. One entrance Gatehouse.
i. Street and yard lighting.
j. 1,400 linear feet of storm sewers.
k. 3,150 linear feet of water lines.

Section F-3: Section F-3 begins on M Street midway between Third and Fourth Streets, S.W. It continues within M Street until Fifth Street, S.E. where it turns passing under the Navy Yard. It terminates at the Anacostia River in the Navy Yard. This 7,525 linear foot section includes:

a. 1,435 linear feet of cut-and-cover.
b. 6,090 linear feet of circular earth tunnel.
c. The Navy Yard Station with a center platform, single entrance and facilities for the handicapped.
d. Ventilation structures in the form of two vent shafts, another combination vent shaft with emergency access and two fan shafts.
e. One underground pumping station.
f. One underground traction power station.
g. One ground-level chilled water plant which will serve two stations.

Section E-2: Section E-2 begins at a point near the intersection of 10th Street and U Street, N.W. and extends to a point near the intersection of 14th Street and Harvard Street, N.W. in the District of Columbia. This 4,803 linear foot section includes:

a. 2,923 linear feet of two single track earth tunnels.
b. 700 linear feet of two single track cut-and-cover box structures.
c. The U Street Station with a center platform, two entrances, and facilities for the handicapped.
d. Ventilation structures in the form of two vent shafts, and one fan shaft combined with emergency access and a tiebreaker station.
e. A combination electric substation and chilled water plant for air-conditioning of the U Street station.

Section FK-2: Section FK-2 is the finish contract for the Clarendon Station, and of other facilities in Section K-2, which is located generally under Fairfax Drive beginning at North Barton Street midway between Wilson Boulevard and Fairfax Drive, and extending to the intersection of Fairfax Drive and Wilson Boulevard (immediately west of Clarendon Circle), in Arlington, Virginia. This contract includes:

a. All finish work at this station (architectural finishes, mechanical equipment, air-conditioning and ventilating equipment, and electrical equipment and lighting).
b. All finish work in the tunnels (mechanical work, chilled water piping, electrical work -- conduits, wiring, lighting).
c. All finish work and equipment in the chilled water plant.
d. All finish work and equipment in the fan shaft.

Trackwork-5: Trackwork-5 consists of approximately 28.5 miles of main tracks, yard tracks and secondary tracks, including contact rails and necessary appurtenances, for Phase V operation of the Metro System. The limit of work comprises the following approximate length of transit lines:

a.	Vienna Route	- Station 322+00 to 795+00 Sections K-5, K-6 and K-7	8.96 miles
b.	Huntington Route	- Station 346+05 to 561+50 Sections C-8d, C-9, C-10a C-10b and C-10c	4.06 miles
c.	Springfield Route	- Station 500+40 to 585+50 Section J-1	1.60 miles
d.	Addison Route	- Station 283+08 to 488+00 Sections G-1, G-2 and G-3	3.88 miles
e.	Falls Church Yard	- Section K-8	4.50 miles
f.	Alexandria Yard	- Section C-11	5.50 miles

Section K-7: Section K-7 begins near the intersection of Nutley Road and I-66 and extends to near the intersection of I-66 and Interstate I-495. This 16,958 linear foot section includes:

a. The Dunn Loring Station with a center platform single entrance and facilities for the handicapped.
b. The Vienna Station with a center platform, double entrance and facilities for the handicapped.
c. Relocation of the east bound lane of I-66 in the vicinity of the Vienna Station.
d. Three pedestrian bridges over I-66.
e. Three 1,000 car parking lots.
f. Four traction power substations.
g. Two tie breaker stations.
h. Access roads at both stations.
i. Modification of ramp and bridge connecting north bound I-495 to west bound I-66.

Section K-8a: Section K-8a is the West Falls Church Service and Inspection Yard which will serve both the Vienna Route and the future Dulless Airport line. With a Metro car storage capacity of 102 cars and future accommodations for an additional 40 cars, the main functions of the yard will include storage of Metro cars during off-peak hours, minor repairs and servicing of cars, interior and exterior cleaning of cars, and scheduled inspection of cars. The site, emcompassing 35 acres, is located in Fairfax County northwest of the City of Falls Church, Virginia, at the intersection of Leesburg Pike (Route 7) and Idylwood Road and is bounded by the proposed Interstate Route 66 on the south and the proposed Dulles Airport connector highway on the east. This contract includes:

a. Yard operations building (4,256 square feet).
b. Yard service building (1315 square feet)
c. One traction power substation building (4,720 square feet).
d. Two tie breaker buildings (551 square feet each).
e. Two car interior cleaning platforms.
f. One security gatehouse.
g. One access road bridge.
h. 3,200 linear feet of access roads.
i. One employee's stairway to connect to the employee's bridge over I-66.
j. 1.3 acre storm water management pond and outlet structure.
k. 581 linear feet of accoustical barrier wall.
l. 1,400 linear feet earth screening berm.
m. Street and yard lighting.
n. Paved parking areas for 90 employee and Authority vehicles.
o. 7,300 linear feet of storm sewers.
p. 4,015 linear feet of sanitary sewers.
q. 2,390 linear feet of water lines.
r. Excavation of 250,000 cubic yards for site grading (cut & fill).
s. Relocation of 2,500 linear feet of 115 KVA power transmission lines.

Section K-8b: Section K-8b consists of the Service and Inspection Shop structure located in the Vienna Route Service and Inspection Yard. This section includes:

a. Approximately 71,000 square foot shop building.
b. Equipment for maintenance such as truck and body hoists, wheel truing machine and turntables.
c. Yard control center.
d. Utilities and necessary appurtenances.

Section K-6 : Section K-6 begins at the Arlington and Fairfax County line and extends to the intersection of proposed I-66 and I-495. This 17,216 foot section includes:

a. One traction power substation.
b. Three tie breaker stations.
c. The West Falls Church Station with two center platform and facilities for the handicapped.
d. Two pedestrian bridges over I-66.
e. Two access roads to West Falls Church station.
f. A 990 car parking lot.
g. A 1,203 linear foot aerial structure over I-495.
h. A 141 linear foot bridge over Route #7.
i. A 70 linear foot bridge over Ramp "A".
j. A 795 linear foot double box turnout to yard.
k. 15,150 linear feet of at-grade construction.

Section FD-13a: Section FD-13a is the finish contract for the Cheverly Station. This contract includes all finish station work, structural and architectural concrete, stone work, electrical and mechanical work for this side platform station and aerial mezzanine.

Section FD-13b: Section FD-13b is the finish contract for the Landover Station. This contract includes all finish station work, structural and architectural concrete, stone work, electrical and mechanical work for this side platform station and subsurface mezzanine.

Section FK-1: Section FK-1 is the finish contract for the Court House Station, twin tunnels and other facilities in Section K-1, which begins at a point under the intersection of North Lynn Street and Fairfax Drive and extends generally westward under North 16th Street to the station located between North Veitch Street and North Barton Street and south of Wilson Boulevard in Arlington County, Virginia. This contract includes:

a. All finish work at the station (architectural finishes, air-conditioning, electrical, mechanical and ventilating equipment and lighting).
b. All finish work in the 4,425 linear foot twin tunnels (chilled water piping, electrical conduits, wiring and lighting).
c. All finish work and equipment in the fan shaft.

<u>Graphics-4</u>: Graphics-4 (GR-4) provides graphics at 12 stations for operating Phase IV. The twelve stations for Phase IV operations are: Zoological Park, Cleveland Park, Van Ness, Court House, Clarendon, Ballston, Glebe Road, Gallery Place (Route F), Archives, L'Enfant Plaza (Route F), Waterfront and Navy Yard. Graphics-4 includes:

a. Procelain enamel pylons.
b. Bronze identification pylons for station entrances at all stations.
c. Parking-lot signs.
d. Service-room-area graphics (room identification and exit signs).

RESPONSES TO COMMENTS OF THE NORTHERN VIRGINIA PLANNING DISTRICT COMMISSION (keyed to pages and paragraphs in letter)

1. Scope and Detail of Studies (page 1, paragraph 2)

This study is designed to determine the region-wide environmental impacts of the Metro system and does not, therefore, include detailed analyses of local impacts. Part II of this study as revised, Route Summaries and Critical Area Identification, identifies areas in which the different elements of the system can be anticipated to have impacts of critical local concern. Detailed analyses of local impacts are presented in Route Environmental Studies available from WMATA.

2. Sedimentation and Floodplain Controls (page 1, paragraphs 4 and 5

Appendix F of this study presents an inventory of local ordinances and state laws governing all aspects of development, including sedimentation and floodplain controls. In Section 2 of this study as revised in the subsection discussing Natural and Ecological Impacts, floodplains and erosion potential in the region are analyzed as they relate to the Metro system. Part III, Appendix C, The Geology and Watershed's Study, discusses such impacts in terms of the watersheds in which they are anticipated to occur.

Part II of this study, Route Summaries and Critical Areas Identification, indicates among areas of potential local critical concern, those areas in which impingement upon floodplains and sedimentation problems can be anticipated. This section identifies such impacts in local terms, i.e., in terms of their immediate impact. Detailed analysis of such areas is presented in Route Environmental Studies available from WMATA.

3. Further Investigation and Information Concerning Specific Impacts (page 2, paragraph 1)

More detailed information concerning specific impacts of the routes and stations, including natural and ecological impacts, social and economic impacts, and visual and physical impacts is presented in the Route Environmental Studies currently underway. Those Route Environmental Studies that have been completed are available from WMATA for review.

4. Region-wide Impact of the System (page 2, paragraph 1)

Additional region-wide impact analysis is presented in Part I Section 2 and in Part III, Appendices, of the Study, as revised. Such additional analysis is primarily in the areas of natural and ecological impacts and social and economic impacts.

ADVISORY COUNCIL
ON
HISTORIC PRESERVATION

WASHINGTON, D.C. 20240

April 27, 1973

Mr. Martin Convisser
Director, Office of Environmental
Affairs
Office of the Secretary of Transportation
Washington, D.C. 20590

Dear Mr. Convisser:

The Advisory Council on Historic Preservation has reviewed the draft environmental statement prepared by the Washington Metropolitan Area Transit Authority concerning the construction of the Washington METRO system. In doing so, we have determined that the construction will affect several properties listed on the National Register of Historic Places and other properties which appear to qualify for National Register status. Those properties currently on the Register which are to be affected are:

The Church of the Epiphany
1317 G St., N.W.

Riggs National Bank, Southwest Corner
9th and F Sts., N.W.

National Savings and Trust Company
New York Avenue and 15th St., N.W.

U.S. Department of the Treasury
1500 Pennsylvania Ave., N.W.

Adas Israel Synagogue
3rd and G Sts., N.W.

Union Station
Massachusetts and Delaware Ave., N.W.

Congressional Cemetery
1801 E. St., S.E.

Smithsonian Building
Jefferson Drive at 10th St., S.W.

Freer Gallery of Art
12th St. and Jefferson Drive., S.W.

Old Patent Office (National Portrait Gallery)
F St., between 7th and 9th Sts., N.W.

In accordance, therefore, with Advisory Council procedures for compliance with Section 106 of the National Historic Preservation Act of 1966 (copy enclosed) the Council finds it appropriate that the Department of Transportation request a consultation among representatives of the Advisory Council, the Department of Transportation, and the Historic Preservation Officer for the District of Columbia.

In order to expedite the consultation process, it is requested that the Advisory Council be furnished with a preliminary report containing the following information:

1. a general description of the proposed undertaking with graphic materials, including relevant maps, photographs and drawings;

2. a list of the National Register properties to be affected by the undertaking, identifying the significant historical, architectural, and archeological features of each property;

3. an evaluation of the effect or effects of the undertaking upon each National Register property, with relevant graphic materials showing the impact and the relationship of the proposed undertaking to the property's historical, architectural, and/or archeological values;

4. an outline of measures taken in considering the effect of the undertaking upon each National Register property, including:

   a. an expression of views of the State Historic Preservation Officer;

   b. an indication of the support or opposition of units of government and private agencies and organizations, within the State;

   c. a review of alternatives that would remove any adverse effects upon each National Register property; and

   d. a review of alternatives that would mitigate any adverse effects upon each National Register property.

Your cooperation is appreciated.

Sincerely yours,

Ken Ta

Ken Tapman
Compliance Officer

Enclosure

RESPONSE TO COMMENTS OF THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

In response to the comments of the Advisory Council on Historic Preservation, WMATA entered into an agreement with the Council and the preservation officers of the affected jurisdictions to establish a systematic review process to allow detailed review of potential impacts of each Metro section at the time of preparation of final Plans. This timing fosters the most efficient coordination of Metro planning and designing with historic preservation efforts, as it is at the time of final Plans that the degree of potential impacts can be specified and that detailed design modifications can be made to avoid or minimize such impacts. An expanded list of historic sites potentially affected by Metro alignments is presented in the Impacts of Parkland, Historic and Archaeological Sites subsection of Section 2 of this Report as revised, The Probable Impact of the Proposed Action on the Environment. Appendix B in Part III of the Report sets out copies of correspondence between WMATA and the Advisory Council on Historic Preservation resulting from impact reviews to date at the time of final Plans.

At the time of final plans, WMATA shall hire the services of an architectural historian to survey each alignment to determine the location of any historic sites that may be eligible for the National Register and shall include any such sites in the detailed review of potential impacts by the Advisory Council on Historic Preservation and the preservation officers of the affected jurisdictions.

The review process is designed to respond to the requirements of Section 106 of the National Historic Preservation Act of 1966 and Section 4 (f) of the Federal Highway Act of 1968.

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS
1221 EAST BROAD STREET
RICHMOND, VA. 23219

H. REESE SMITH
ENVIRONMENTAL QUALITY ENGINEER

April 10, 1973

IN REPLY PLEASE REFER TO

Washington Metropolitan Area
Transit Authority
Draft Environmental Statement
(February 1973)

Mr. Martin Convisser
Director, Office of Environmental Affairs
Office of the Secretary of Transportation
Washington, D.C. 20590

Dear Mr. Convisser:

Reference is made to your letter dated February 27, 1973, to Mr. Russell E. Train, Chairman, Council on Environmental Quality by copy of which the Virginia Department of Highways was circulated an impact statement for comments.

Our Transportation Planning Engineer has reviewed the Draft Environmental Impact Statement and has prepared the following comments.

Page VI - Paragraph 3-1 - It would appear that this statement on the reduction in vehicle trips is based on the Berwager and Wickstrom automotive emission study. Therefore, this would in fact be 1976 volumes and does not consider mode of arrival at the transit station. As a result of the inability of that study to determine modal interchange, the resulting reduction in traffic volumes is rather liberal. The implied 1980 transit ridership from that study is greater than 1.2 million passengers (4.5 million potential 1980 auto vehicle trips will be less than the actual 3.3 million 1968 auto vehicle trips). In reviewing Table 3 on page 17, the average daily transit patronage in 1990 will be less than 0.9 million. It seems highly questionable that transit ridership is being forecasted to be reduced after implementing a new innovative system.

Page 232 and 233 - It would appear that this environmental impact statement should be based on the K route being the only transportation facility in this corridor since the location studies for I-66 have not been completed. There appear to be approximately eight possible alternatives within this location study, one of which is a null alternative and five with METRO only.

In general the impact of vehicular traffic to the station sites is neglected. We are aware that a functional mode of access model has not been developed, but it would appear that this impact cannot be completely disregarded. By neglecting this mode of access factor there is no indication as to the magnitude of the area which may be impacted by transit patrons going to or from the stations.

There also appears to be no indication as to the magnitude of the impact on major highway facilities which might result from friction between modal interchange passengers and vehicular traffic that cannot utilize METRO or feeder bus to METRO to make a trip.

We thank you for the opportunity of commenting on this statement.

Sincerely,

H. Reese Smith

H. Reese Smith
Environmental Quality Engineer

COMMONWEALTH OF VIRGINIA

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J. M. WRAY, JR., DIRECTOR OF OPERATIONS

H. REESE SMITH
ENVIRONMENTAL QUALITY ENGINEER

April 17, 1973

IN REPLY PLEASE REFER TO

Washington Metropolitan Area
Transit Authority
Draft Environmental Statement
(February 1973)

Mr. Martin Convisser
Director, Office of Environmental Affairs
Office of the Secretary of Transportation
Washington, D.C. 20590

Dear Mr. Convisser:

As a supplement to our letter dated April 10, 1973, we would like to offer the following comments received from Mr. P. B. Coldiron, Location and Design Engineer.

Hydrologic Effect

1. Page 43 - Paragraph 3 - City of Alexandria and Corps of Engineers are presently planning a relocation of the relocated channel. Work appears to be much more extensive than in the area of Route J than original highway channel relocation.

Huntington Route C

2. Page 179 - Paragraph 2 - The route proceeds in a walled cut section from the portal east of Jefferson Davis Highway eastward under Memorial Drive, then rise to surface, rather than an on-grade section as stated.

3. Page 179 and 180 - It is indicated that the METRO facility is on the surface through the area of east approaches to the proposed bridges over the R. F. & P. Railroad's Potomac Yards. The plans for highway project 0001-100-102, RW-201, C-501, B-601, B-602, were not designed to provide for surface construction of METRO east of the existing tracks at this location.

4. Page 187 - Paragraph 4 - Other major constructions have occurred in this area besides highway construction, like the Pentagon and its parking lot and the George Washington Memorial Parkway.

Franconia Route H

5. Page 219 - Paragraph 1 - Preliminary plans of the beltway widening have been submitted to WMATA. Cooperative development is anticipated. Soil conditions at this location may be a problem.

Springfield Route J

6. Page 225 - Paragraph 5 - Preliminary plans of the beltway widening have been submitted to WMATA. Cooperative development is anticipated.

Vienna Route K

7. Page 227 - Map 33 - Word description and the map infer that the cut and cover section terminates in the vicinity of Patrick Henry Drive. This should be corrected by giving the location of portal which is just east of Harrison Street.

8. Page 228 - Paragraph 1 and Page 233 - Paragraph 2 - Statements on these pages unduly contribute impacts to the construction of Interstate Route 66. It appears that the author is stating that the impact METRO will have will be negligible because the I-66 impact will be greater.

   I believe that these statements should be reworded to eliminate this insinuation. One reason this should be done is that it is a possibility that METRO's construction will proceed that of I-66's construction. Therefore, METRO would have to assume the full impact for their facility.

L'Enfant - Pentagon Route L

9. Page 238 - Paragraph 5 - Work has been added to Virginia Department of Highway's contract that is presently underway. This $12,500,000 will complete all surface work on this Line L in Virginia. Pedestrian access was compromised. The storm sewer outfall was disrupted and a siphon was required.

Comments Relating to Drainage and Erosion Impact

10. The overall report seems to use every opportunity to shift impact to the proposed highway projects in the area.

    While this may be true, if and when the projects are constructed, a certain portion of the impact is increased due to the modifications of highway plans to accommodate the METRO development plans.

    Specific reference on pages 43, 48, 228 and 233 should be reworded and/or qualified to clarify the above mentioned facts.

Sincerely,

H. Reese Smith

H. Reese Smith
Environmental Quality Engineer

RESPONSE TO COMMENTS OF THE
VIRGINIA DEPARTMENT OF HIGHWAYS (keyed to pages and paragraphs of letter)

1. Metro Transit Ridership (4/10/73 letter, p.1, para.3)

Revised VMT and transit ridership projections based upon the current draft revised Net Income Analysis (July, 1974) have been incorporated on page VI, paragraph 3-1, and Table 3 on page 17.

2. Revised References to Highway Route Locations and Highway and Metro Construction Impacts Including Drainage and Erosion Impacts and Comments on Specific Metro Routes (4/10/73 letter, p.1, para.4; 4/17/73 letter, pp.1,2, items 1 through 10)

Modifications in text to take into account changes and delays in highway plans, etc., have been made on the following pages of the draft study, pp. 43, 48, 179, 180, 187, 219, 225, 227, 228, 233, and 238.

3. Vehicular Traffic at Stations; Metro Access Traffic and Other Traffic (4/10/73 letter, p.2, paras. 1 and 2)

Appendix H of this report, the Air Quality Study, presents a model for evaluation of the air pollution impact of vehicular traffic at stations. Part II of this report, Route Summaries and Critical Areas Identification, identifies areas in which existing traffic congestion suggests a potential conflict between Metro access traffic and other traffic.

For detailed analyses of these impacts, references should be made to the Route Environmental Statements currently in preparation. Completed Route Environmental Statements are available from WMATA for review.

metropolitan washington
COUNCIL OF GOVERNMENTS
1225 Connecticut Avenue, N.W., Washington, D. C. 20036 223-6800

METROPOLITAN CLEARINGHOUSE REVIEW COMMENTS

COG PROJECT NUMBER: 73-R-T/EIS-11

PROJECT NAME: Draft Environmental Impact Statement for METRO

APPLICANT: Washington Metropolitan Area Transit Authority

FEDERAL AGENCY: U.S. Department of Transportation

FEDERAL PROGRAM AND AUTHORIZATION: National Environmental Policy Act of 1969, Section 102(2)(c)

PROJECT DESCRIPTION:

This draft environmental impact statement for the METRO rapid rail transit system has been prepared in order to comply with the spirit and letter of provisions of Section 102(2)(c) of the National Environmental Policy Act of 1969.

The statement is an appraisal of the general impact of construction and operation of the proposed 97.7 miles of the METRO system upon the natural and man-made environment in ecological, socio-economic and visual terms.

RELATIONSHIP TO THE METROPOLITAN PLANNING PROCESS AND THE ACHIEVEMENT OF AREAWIDE GOALS AND OBJECTIVES:

Transportation

The METRO Adopted Regional System is consistent with the regional goals and objectives of developing a transportation system which effectively supports adopted land use policies and provides renewed emphasis on public transportation modes. METRO will do much to reduce the reliance on the private auto, especially for work-oriented travel, and to minimize the effects of future travel demands on the environment. Local acceptance and support of METRO has been demonstrated by voter approval of local bond issues to support METRO and the participation of local officials on the Board of Directors of the Washington Metropolitan Area Transit Authority.

The projections of 1990 ridership used in the draft statement are generally consistent with the levels being forecasted by the Transportation Planning Board in its alternative testing work, although the base population of 7.7 million in the Year 2000, quoted in the draft environmental impact statement, has been

revised. This figure has received extensive scrutiny in the past two years resulting in a downward revision to a "control total" population of approximately 5.9 million. There is evidence that projections provided by local governments through 1992 would probably yield a total even less than 5.9 million by the Year 2000. Preliminary COG projections indicate that this population differential will not significantly affect patronage since most passengers will begin their trips within the beltway. Other stated long range system benefits -- such as value of time savings accruing to non-users and benefits to the economic base of the region -- are less susceptible to evaluation and cannot be addressed at this time.

There are certain shorter-term, more localized effects that should be evaluated in a system environmental impact statement. Among these are the following:

(1) <u>Localized effects at METRO stations</u>.

METRO will generate large concentrations of traffic near its 82 stations. A consideration of the impacts caused by this traffic and measures to minimize them would be useful. The draft statement points out the potential for circulation problems around the non-core METRO stations. Access to METRO -- especially at the non-core stations -- is one issue that needs further investigation. In particular, non-automotive means of gaining access to stations should be encouraged. Bicycle access to the stations, for example, may offer considerable patron access potential and, if feasible, may reduce the negative impact of the automobile circulation and parking problems.

(2) <u>Impacts of interim systems</u>.

There is little discussion of impacts caused by interim system configurations. For example, it now appears that the METRO Silver Spring Station, located in an area of existing congestion, will be a METRO terminus for more than three years. A discussion of alternative strategies for getting riders to and from this station during this interval would seem warranted in a statement of this type. Similar cases will exist at other temporary system termini -- such as, Rosslyn and National Airport -- for shorter periods.

These two deficiencies could be overcome concurrently in the route-by-route discussion (Route Summary Section of the draft environmental impact statement), locations of critical access problems could be identified and commented on individually. Methods of reducing traffic congestion while providing for adequate station access could be addressed in the context of both interim and completed system conditions.

Much of the work needed to develop this impact evaluation is currently, or soon will be, underway. As mentioned in the draft statement, a number of technical studies dealing with METRO

stations are being conducted. Among these are the station access studies by local and state transportation agencies, a study of the Silver Spring terminus by the Washington Suburban Transit Commission, and the WMATA technical studies to develop interim and final feeder bus operation. All of these efforts could provide information needed to develop impact statements which address more specific problems of METRO access and WMATA is urged to continue to cooperate with local agencies in station impact studies and to consider the recommendations derived from them before final design is approved.

Environmental Quality

As pointed out in the environmental statement, a study done by COG for the U.S. Department of Transportation indicated that METRO would significantly lower total automotive pollution in the Washington area. Such reductions are required if the Metropolitan area is to achieve and maintain ambient air quality standards as set forth by the Environmental Protection Agency.

There are two issues which warrant concern. The first is that some attention in a system-wide environmental statement should be given to the effects on air quality of METRO-generated localized traffic congestion, especially in areas which currently exceed or nearly exceed air quality standards.

The other issue is the secondary effects on air quality caused by changes in land use generated by METRO. High density development in METRO corridors will likely cause decreased automotive emissions but will increase concentrations of emissions. There is a possibility that METRO will encourage development in fringe areas. If this occurs, then air quality would be adversely affected due to increased auto travel.

While these problems are not solely the responsibility of WMATA, they do need to be addressed in the environmental impact statement.

Because the environmental impact statement addresses the entire METRO system in broad terms, the information is not of sufficient detail to evaluate the impact of each station or route on the environment. WMATA must insure that the METRO system is in substantial conformance with the implementation plan revisions for air quality which have been submitted by the three states this year. These plans are based, in large part, on the recommendations to Governors on transportation and other necessary air pollution control measures which were developed by the National Capital Interstate Air Quality Control Region. In addition, WMATA must insure that each station and route of the METRO system will not adversely affect existing water quality by strict adherence to standards and control ordinances. Currently, WMATA has no minimum distance requirements between tracks and buildings in use. Because there are potential adverse noise and vibration levels which could affect people and buildings, WMATA must insure that adequate precautionary measures are taken. The affect of sedimentation cuased by construction and the disposal of spoil must also be addressed in greater detail.

Land Use

The impact of METRO upon land use in the region has significant potential for rectifying some of the imbalances of households and job distribution that have emerged over the years. Careful planning for station impact areas will be required to insure that the accessibility benefits provided by the METRO system will not be lost or ineffectively used especially with respect to low and moderate income households. WMATA should continue to work closely with local governments in developing plans for station impact areas that reflect the need for job/household balance, including consideration for provision of low and moderate income housing resources. This is particularly significant in a time when many local governments are reassessing the desirability of continued rapid growth and are seeking new methods of controlling its impact.

Relocation

WMATA has made an important contribution to the evaluation of METRO's impact on the metropolitan community through its efforts to quantify business and residential displacement which will result from METRO development. It is estimated that 582 businesses and 874 households will be dislocated by land acquisition and construction activities over the next ten years. The largest percentage of total displacement activity will take place in the District of Columbia, with the majority of residential displacement occurring in the District, the City of Alexandria and Prince George's County.

Information included in this statement on the size and income of the households to be displaced is particularly useful in addressing the relocation impact of METRO during the entire development phase. The relocation studies of 254 households currently completed by WMATA indicate that 72% of the families to be relocated are characterized as having low income, with an additional 19% in the moderate income category. Based on the findings of these studies, it is probable that a high proportion of all displacement activities will involve low and moderate income households. As noted in the draft statement, these families should receive priority in obtaining housing in public and federally assisted units.

In the Washington Metropolitan Area, the demand for low and moderate cost housing far outstrips the supply as indicated by the 1970 Census figure of a 3% vacancy rate for all housing units in the Washington Metropolitan Area. Lack of sufficient housing resources for low and moderate income households is evidenced by the 12,000 persons on waiting lists for public housing throughout the metropolitan area as of June 30, 1972. The Department of Housing and Urban Development has estimated that 9300 units of public and federally assisted housing could be absorbed in this area annually. During this fiscal year, only 800 of these units have received funding commitments. To date, approximately 15,000 units of public housing and 20,000 units of federally assisted housing are currently occupied or under construction in the metropolitan area.

The impact of residential displacement by the METRO system, therefore, will be to further strain already limited housing resources. To alleviate this problem, WMATA should assume its responsibility for the development of replacement housing for low and moderate income families with project funding as authorized in Section 206(a) of the 1970 Relocation Act. WMATA financing of replacement housing would greatly assist in reducing any indirect negative impact which METRO development might have upon the metropolitan residential community. Authorization to provide Section 215 seed money loans to non-profit, limited dividend or cooperative organizations or public bodies, such as local housing authorities, for planning and obtaining Federal mortgage insurance for replacement housing is an added stimulus to the development of these much needed resources.

WMATA is currently represented on COG's Relocation Subcommittee of the Housing Technical Committee. This committee provides a forum for discussion of relocation needs and plans throughout the metropolitan area, and thus affords an opportunity for greater coordination of all relocation efforts. The committee is currently undertaking a study of residential displacement and relocation demands which will serve as the basis of a replacement housing plan to identify relocation resources. It is hoped that WMATA will continue to participate in the work of this committee, particularly in light of the metropolitanwide impact of the transit system's development.

Services for the Elderly and Handicapped

WMATA should be commended for its recognition of the need to increase transit accessibility for the aged and handicapped. It is difficult to determine from the information provided in this statement, however, what specific impact the proposed system will have on improving accessibility to the elderly and handicapped. In addition, no reference is made to the possibility of reduced fares for this segment of the population.

On June 11, 1970, the COG Board of Directors adopted a resolution urging provision of facilities for the handicapped in the METRO system. The Board noted that the proposed use of escalators as the sole means to transport people to and from the station is not adequate to meet the needs of the handicapped, and in connection with this resolution recommended that WMATA obtain additional funds to insure installation of elevators in the METRO system (see attachment). Support of this position was reiterated by the COG Board's adoption of the report entitled A Focus on Rehabilitation in Metropolitan Washington. This report stressed the need for both reduced transit fares and increased accessibility for aged and handicapped persons in the metropolitan area. It is hoped that WMATA will continue to consider the needs of these groups in future planning and development of the transit system.

In conclusion, the Environmental Impact Statement should be expanded to include a detailed anaylsis of the impact of each element of the system and each reasonable alternative for such elements or a separate statement should be developed for each

element and alternative.

Future developments could cause changes in system characteristics that would warrant additional evaluation of environmental impacts. Corridor studies being conducted by other agencies -- e.g. the Maryland Department of Transportation's Western Prince George's County Transportation Alternative Study -- may result in basic changes in alignment and station locations of certain lines. A change in plans for other facilities might result in a lack of available right-of-way for METRO construction.

STAFF RECOMMENDATION:

The staff recommends endorsement of these comments by the Transportation Planning Board, Human Resources Policy Committee, Health and Environmental Protection Policy Committee, and the Land Use Policy Committee.

COMMITTEE RECOMMENDATION:

The Transportation Planning Board endorsed these comments on April 18. The Human Resources Policy Committee endorsed these comments on April 19. The Health and Environmental Protection Policy Committee endorsed these comments on April 25. The Land Use Policy Committee endorsed these comments on April 26 and also endorsed the comments by the Maryland-National Capital Park and Planning Commission (see attached).

Resolution Adopted
6/11/70 145

Resolution Urging Provision of Facilities for the Handicapped in the METRO System

WHEREAS, the Metropolitan Washington Council of Governments recognizes the vital importance of transportation mobility for the handicapped: and

WHEREAS, improved accessibility to employment, social and recreational opportunities can add significantly to the productivity and contributions to society of the handicapped; and

WHEREAS, Public Law 90-48, enacted August 12, 1968, insures that all buildings and structures which are to be used by the general public and are financed in whole or in part with Federal funds be designed and constructed so as to be accessible to the physically handicapped; and

WHEREAS, Public Law 91-205, enacted March 5, 1970, amends Public Law 90-48 to include subway stations and surface stations such as those constructed under the authority of the National Capital Transportation Act of 1960, the National Capital Transportation Act of 1965, and Title III of the Washington Metropolitan Area Transit Regulation Compact; and

WHEREAS, the Washington Metropolitan Area Transit Authority is constructing the METRO system in compliance with the "American Standards Specifications for Making Buildings and Facilities Accessible to and Usable by, the Physically Handicapped," approved by the American Standards Association, Inc., the American clearing house for standards activity on the national level; and

WHEREAS, the Washington Metropolitan Area Transit Authority is working closely with the Ad Hoc Committee on Transportation of the President's Committee on Employment of the Handicapped to develop designs for moving the nonambulatory handicapped from surface to subway station platform levels; and

WHEREAS, it is essential to achieve immediate design solutions and funding support for the safe and efficient movement of the handicapped in order to incorporate the necessary facilities into the construction of the major METRO stations; and

WHEREAS, the design of the escalators for the present system as a sole means to transport people to and from the station is not adequate to meet the needs of the handicapped,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS:

That the Metropolitan Washington Council of Governments urges the Washington Metropolitan Area Transit Authority to make provision for all appropriate facilities for the safe and efficient movement of the handicapped with the METRO system, and to actively seek funding support from the U.S. Department of Transportation and other public and private sources to finance the installation of these essential facilities for the handicapped.

That copies of the Resolution be transmitted to appropriate Congressional Committees, Federal Agencies, Local Governments, the Washington Metropolitan Area Transit Authority, and Congressmen and Senators representing the Washington Metropolitan Area.

RESPONSE TO COMMENTS OF THE METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS (keyed to pages and paragraphs of letter)

1. Revised Population and Employment Projections Based Upon 1970 Census Data (pages 1 and 2, paragraph 4)

A review of the most currently available population and employment projections (March 1974) from WASHCOG (not official and for study purposes only) indicates that total 1995 regional population is projected to be 4,742,555 and total 1995 regional employment is projected to be 2,420,947. WASHCOG comments on the Draft Environmental Statement note that this population differential will not significantly affect patronage since most passengers will begin their trips within the Beltway.

Footnotes have been added on those pages of this report discussing or presenting in graphic form population and employment projections, indicating revised estimates as of March 1974. (See pages 53, 55, and 57 of this report.)

2. Local Impacts at Critical Access Points; Metro Stations and Interim Systems (page 2, paragraph 2)

Detailed information concerning local impacts of Metro stations and interim systems and efforts to mitigate any such impacts that are adverse are presented in Route Environment Studies available from WMATA for review. In this, the revised system-wide Environmental Statement, such potential local impacts are identified in Part II of this report, Route Summaries and Critical Area Identification in terms of potential increases in traffic congestion from conflicts between Metro access traffic and other traffic and potential air and noise pollution problems. A brief discussion of interim stations is presented in Section 1, Description of the Proposed Action and its Purposes. A more detailed review is presented in Part III of the Study in Appendix D, Details of Metro Characteristics.

3. Air Quality (page 3, paragraphs 3, 4, 5 and 6)

Areas of potential local concern for air quality from Metro generated localized traffic congestion are indicated in Part II of this revised Report, Route Summaries and Critical Area Identification. Specific details of such projected impacts and of changes in air quality from Metro-stimulated land development are discussed in Route Environmental Studies.

The implications of construction and operation of the entire Metro system for conformance to the Air Quality Implementation Plans for the two states and the region are discussed in Appendix H of this Report, the Air Quality Study; a summary of the study's conclusions is set out in Section 2 of this Report under the subsection entitled Natural and Ecological Impacts.

4. Water Quality (page 3, paragraph 6)

The potential relationship between routes and stations and water quality is dealt with in terms of the region and of watershed in Appendix C of this Report, the Geology and Watershed Study; a summary of the conclusions of this study is presented in the Natural and Ecological Impacts subsection of Section 2 of this report. Specific potential areas of local concern for water quality are identified in Part II of this Report, Route Summaries and Critical Area Identification. A detailed discussion of such impacts is presented in the Route Environmental Studies, available from WMATA for review.

5. Potential Noise and Vibration Levels (page 3, paragraph 6)

Potential noise and vibration levels anticipated from construction and operation of Metro are discussed in regional terms in Section 2 of this report in the subsection, Natural and Ecological Impacts. Specific potential instances of such impacts are identified, route by route in Part II, Route Summaries and Critical Area Identification. A detailed analysis of these impacts is discussed in the Route Environmental Studies, available from WMATA for review.

6. Spoils Disposal and Sedimentation (page 3, paragraph 6)

Spoils disposal and potential sedimentation from Metro construction are discussed in regional terms in the Natural and Ecological Impacts subsection of Section 2 of this report. Potential local instances of sedimentation problems are identified in Part II of this Report, Route Summaries and Critical Area Identification. Detailed discussion of adverse impacts of these kinds and means by which to mitigate them are presented in Route Environmental Studies, available from WMATA for review.

7. Job/Household Balance; Low and Moderate Income Housing (pg.4,para.7)

A discussion of job/household balance, and low and moderate income housing is presented under the Social and Economic Impacts subsection of Section 2 of this report.

8. Relocation (pages 4 and 5, paragraphs 2, 3, 4, 1 and 2)

A discussion of relocation throughout the system and WMATA's policies concerning relocation is presented under the subsection of Section 2 dealing with Social and Economic Impacts. The location of urban renewal areas and major capital improvements that have resulted in relocations of households and businesses is noted on maps in Part II of this Report, Route Summaries and Critical Area Identification. Details of potential dislocation by the regional rapid rail system are presented in Route Environmental statements available from WMATA.

9. Services for the Elderly and the Handicapped (pp.5,6,paras.3,4,5)

A detailed description of WMATA System services for the elderly and the handicapped is presented in Part III, Appendix Detailed Metro Characteristics; a summary is presented in Section 2 of this Report.

10. Detailed Analysis of System Segments (page 6, paragraph 2)

Detailed analyses of system segments are presented in Route Environmental Studies, available from WMATA for review.

An identification of areas of potential impacts of critical local concern is presented in Part II of this Report, Route Summaries and Critical Areas Identification.

COMMONWEALTH OF VIRGINIA
COUNTY OF FAIRFAX
FAIRFAX, VIRGINIA 22030

May 1, 1973

Mr. Walter Scheiber
Executive Director
Metropolitan Washington
Council of Governments
1225 Connecticut Avenue NW
Washington, D.C. 20036

Subject: Fairfax County Comment and Review for Draft Environmental Impact Statement for METRO

Dear Walter:

The A-95 review for METRO causes me some problems:

1. The METRO Draft Environmental Impact Statement has been prepared some years after the basic decision to construct METRO (i.e., the basic "major action" involved with METRO) and therefore cannot be consistent with the spirit of the Act insofar as that spirit requires environmental impact analysis before the decision to take major action.

2. The Statement relies specifically on generalities; therefore, it is not amenable to specific and finite consideration of either the advanced environmental potential or the qualities (nature, effectiveness, costs, etc.) of the mitigating measures which may be taken.

3. This Statement is lacking sufficient specifics and details to permit effective assessment of environmental impact on Fairfax County in the short term, i.e., during construction. If these specifics and details are not provided in the Environmental Statement, Fairfax County must rely upon detailed working coordination with WMATA and WMATA contractors during the construction phase in order to assure that these aspects are properly considered. Illustrative but not necessarily limiting are:

- erosion and sediment control
- spoils disposal
- control of fugitive dust
- traffic control of construction vehicles
- noise control
- tree cover removal
- wildlife habitat disturbance
- soils engineering
- public utility system interruption and/or relocation

4. The major long term impact on the County will be the effect of METRO on land use, population and related aspects of the future development of the County. Neither the Draft Environmental Impact Statement nor other existing knowledge is adequate to permit effective evaluation of that long term impact.

I do not know how other jurisdictions may be responding to the request for A-95 review. It may be well for your staff to contact our Director of Environmental Affairs, Donald R. Bowman (691-2219), so that we can provide a full and adequate review.

Best regards,

Robert W. Wilson
Acting County Executive

RWW/TJW/vb

cc: Donald R. Bowman
cc: Ms. Caroll Karr

RESPONSE TO COMMENTS OF THE FAIRFAX COUNTY BOARD OF SUPERVISORS (keyed to pages and paragraphs in letter)

1. Timing and Scope of Study (page 1, paragraphs 1 and 2)

As the National Environmental Policy Act was enacted more than a year after the Regional System Plan was adopted, the study, of necessity, began after the basic decision to construct Metro had been made. The present report is designed to present and analyze regional impacts of the Metro system. For more detailed analysis of individual route segments, reference should be made to Route Environmental Studies, available from WMATA.

2. Short-term Construction Impacts (pages 1 and 2, paragraph 3)

Short-term construction impact problems, including erosion, sediment control, spoils disposal, control of dust, traffic control of construction vehicles, noise control, tree cover removal, wildlife habitat disturbance, soils engineering, and public utility system interruption or relocation are dealt with in detail in the Route Environmental Studies, available from WMATA for review.

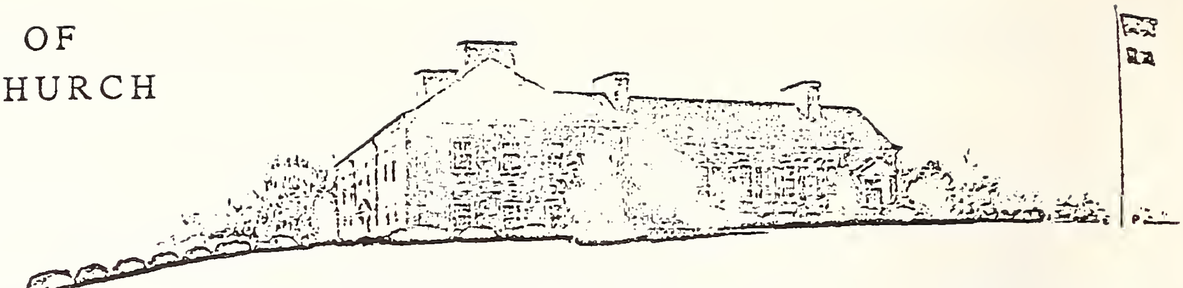
An identification of the areas of potential critical local concern is presented on a route-by-route basis in Part II of this report, Route Summaries and Critical Areas Identification.

3. Land Use and Population (page 2, paragraph 2)

Revised growth projections have been incorporated in this report, as revised, on pages 53, 55, and 57. Detailed growth impacts of the system are considered in detail in Route Environmental Studies available from WMATA; evaluation of such impacts continues in the station impact studies under way in each jurisdiction.

CITY OF
FALLS CHURCH

300 PARK AVENUE FALLS CHURCH, VIRGINIA 22046 (703) 532-0800



May 4, 1973

Mr. Martin Convisser
Director, Office of Environmental Affairs
Office of the Secretary of Transportation
Department of Transportation
Washington, D. C. 20590

Dear Mr. Convisser:

Although addressed to the City Council of Falls Church, Virginia, the draft METRO Environmental Impact Statement, never reached me, a member of that Council, until comments on it came before the Metropolitan Washington COG Land Use Policy Committee last week. I am commenting on the draft, therefore, as soon as I could. Although a supporter of METRO in general, I see needs for changes in some of the specifics that must be faced at once.

Enclosed are certified copies of two resolutions adopted by the Falls Church City Council on January 22, 1973, which are quite pertinent. It is my understanding that the impacts of specific station sites were not incorporated in the draft statement. These resolutions speak to specific sites. Under the rule of including coverage of any action that is likely to have controversial impacts as a "significant action" for coverage in an EIS, I suggest the need for detailed coverage of these and other stations in the METRO EIS. Several alternative locations and traffic designs for these stations have been proposed at local hearings. Inaction on these proposals led to the enclosed

resolutions - both of which carry the implicit observation that the present station plans are environmentally inadequate to many who will be closely affected. Motorized access (including parking, kiss and ride, and buses) to or from the West Falls Church Station from Haycock Road between the Station and Route 7 must be eliminated. Access to that Station in the area of Route 7, west of George Mason High School, must include direct access from I-66 (if it is built) - an extremely essential feature during the three years that the West Falls Church Station is supposed to serve as the "end of the line". Motorized access (including parking, kiss and ride, and buses) to or from the East Falls Church Station from the south side of the station must be only from Sycamore Street and Lee Highway. Anything else would be intolerable for the surrounding neighborhoods, which is why I joined in voting for the enclosed resolutions.

Your attention also is invited to the current "citizen" proposal to alter the station alignment, eliminating the WFC station completely. This is an alternative that should be discussed in the EIS. Along with it, consideration should be given to locating the EFC station to the straight-of-way in the tracks just northwest of Lee Highway, between N. Fairfax Drive and Washington Blvd., and between Lee Highway and Little Falls Road, an area which has a present development more consistent with a METRO stop than has the area around the Sycamore Street site.

As to the view, which I have heard was taken by DOT, that this EIS was not mandatory, I do not agree. I am thoroughly conversant with section 102 (2)(c) of NEPA, and with the CEQ Guidelines. Unless and until the EIS fully, and candidly, deals with the impacts of and alternatives to the specific elements of the METRO system, I have no doubt that an injunction could be had, blocking the incurrance of further Federal obligations on behalf of the system. Such a blow could be next to fatal for this system.

I hope that the narrow, power-protective concern for prerogatives, for implementing last year's (and last decade's) decisions, and for avoiding rethinking will not prevail at either DOT or WMATA.

Yours,

Paul R. Brockman
City Councilman

PRB:cg
Enc.
cc: Mr. Jack Graham
Mr. Walter Scheiber

RES. 73-7

RESOLUTION ESTABLISHING POLICY ON MOTOR VEHICULAR ACCESS TO EAST FALLS CHURCH METRO STATION

THE CITY OF FALLS CHURCH states its opposition to any plan which encourages any type of motor vehicular access to or egress from the East Falls Church METRO STATION through any residential section in Falls Church in the vicinity of the Station.

This is to certify that this is a true and correct copy of a Resolution adopted by the City of Falls Church Council on January 22, 1973.

Robert A. Mattson

Robert A. Mattson, City Clerk

Adopted January 22, 1973
(TR73-5)

RES. 73-6

RESOLUTION ESTABLISHING POLICY ON MOTOR VEHICULAR ACCESS TO WEST FALLS CHURCH METRO STATION

THE CITY OF FALLS CHURCH states its opposition to any plan which:

1) Allows motor vehicular access to or egress from the West Falls Church METRO STATION along Haycock Road between West Broad Street and the station; and

2) Which encourages any type of motor vehicle access to or egress from either the Stations through any residential section in Falls Church in the vicinity of the Station.

3) Fails to use motor vehicle ingress and egress from I-66 instead of Route 7.

This is to certify that this is a true and correct copy of a Resolution adopted by the City of Falls Church Council on January 22, 1973.

Robert A. Mattson

Robert A. Mattson, City Clerk

Adopted January 22, 1973
(TR73-5)

RESPONSE TO COMMENTS OF THE FALLS CHURCH
CITY COUNCIL (keyed to pages and paragraphs of letter)

1. <u>Impacts of Specific Station Sites</u> (pages 1 and 2, paragraph 2)

Potential impacts of specific station sites are identified in Section 2 of Part II of this Report as revised, The Critical Areas Study. Such potential impacts include traffic impacts for Metro stations and for interim terminal stations.

Detailed analyses of specific station sites are presented in Route Environmental Statements available from WMATA for review. These analyses include alternative proposed station locations.

Station design and station access plans are detailed and presented for review at public hearings at the stage of General Plan development. Those public hearings allow for examination of detailed local impacts and refinement and modification of plans to minimize such impacts.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Washington, D. C. 20250

9a

MAY 9 1973

Mr. Martin Convisser
Director
Office of Environmental Affairs
Environment, Safety, and Consumer Affairs
400 Seventh Street, S. W.
Washington. D. C. 20590

Dear Mr. Convisser:

The draft environmental impact statement on Proposed Federal-Aid Highway and Mass Transportation Act of 1973, has been reviewed by the Soil Conservation Service for the Department of Agriculture.

Section II dealing with the probable impact on the environment and particularly the land use effects, overlooks an important positive effect. This is the opportunity to lessen the urbanization pressure on prime agricultural lands.

A balanced transportation system will encourage a more efficient use of both urban and agricultural land and thus either postpone or avoid the necessity of diminishing the use of a valuable natural resource--prime agricultural land. A flexible transportation plan can channel development into urban areas now underutilized or areas less valuable for agricultural production.

Another point which deserves more emphasis is discussed under community effects. It states the proposed legislation, ". . . allows an investment in both urban and rural transit improvements, . . ." Improvement in rural public transportation is a vital part of rural development programs. In rural areas the elderly, the young, and the disabled are drastically cut off from medical, educational, and other essential services. Many of the rural poor cannot afford to own and operate a personal vehicle. Therefore, this aspect of the proposed program supports an important national objective which is to permit people to enjoy a rural life environment which they desire and not force them into a migration to urban areas where their problems of adjustment and their burden on society would be increased

Other than the above comments, we feel the statement provides an adequate description of the environmental impact of the proposed legislation.

We appreciate the opportunity to comment on the statement.

Sincerely,

D.M. Whitt

D. M. Whitt
Deputy Administrator
for Field Services

RESPONSE TO COMMENTS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE (keyed to page and paragraphs of letter)

1. Balanced Transportation System (page 1, paragraphs 2 and 3)

Comments from the Soil Conservation District to the effect that Metro will encourage a more efficient use of both urban and agricultural land have been incorporated in Section 2 of this report in the subsection dealing with social and economic impacts.

2. Investment in Rural Public Transportation (page 1, paragraph 4)

Comments from the Soil Conservation Service to the effect that improvement in rural public transportation is a vital part of rural development programs have also been incorporated in Section 2 of this report in the subsection dealing with social and economic impacts.

WMATA I-6

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MARYLAND 21203

NABPL-E

18 April 1973

J.A.

Mr. Martin Convisser
Director, Office of Environmental
Affairs
Office of the Secretary of Transportation
Washington, D. C. 20590

Dear Mr. Convisser:

The letter from your office dated 27 February 1973 which was forwarded to the Office of the Chief of Engineers in Washington, D. C., has been referred to the Baltimore District for reply since the area of concern is within this District's boundaries. The letter transmitted a copy of the Draft Environmental Statement for the Washington Metropolitan Area Transit Authority for our review and comment.

The Baltimore District has no comment to offer on this statement.

The Council on Environmental Quality has been provided copies of this correspondence.

Sincerely yours,

William E. Trieschman Jr

WILLIAM E. TRIESCHMAN, Jr.
Chief, Planning Division

Memorandum

FEDERAL RAILROAD ADMINISTRATION

DATE: APR 3 1973

In reply refer to:

TO: Director, Office of Environmental Affairs

FROM: Acting Associate Administrator, Office of Policy and Plans

SUBJECT: Draft EIS, Washington Metro System

My staff has reviewed the statement and find it generally acceptable from the view of the Federal Railroad Administration. However, it is suggested that some thought be given to safety of train operation in those areas where construction will be undertaken parallel to existing railroads. This is particularly pertinent in the case of the Glenmont Route. Past experience with this type of construction has indicated that, even with the closest cooperation between the railroad and contractors, the possibility of accidents is significantly increased. It is therefore suggested that some statement indicating the coordination between the involved railroads and WMATA be included in the final report.

William E. Loftus

William E. Loftus

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

APR 2 7 1973

L7619-OCC
ER-73/308

Dear Mr. Convisser:

This constitutes our review of the draft environmental statement on the construction of the Rapid Rail Transit System in the Washington, D.C., metropolitan area. While we view the statement as being generally adequate in addressing the proposal's impact on recreational, cultural, and related resources, there are some aspects on which we have comments.

In many sections of the statement, the analysis of impact on the environment is stated in very general terms. It is recognized that while the maximum available quantitative data should be included, such data cannot always be obtained until plans and designs have been completed. Several instances where quantitative detail and additional environmental analysis would be helpful are as follows:

Natural and Ecological Impacts

1. The statement does not describe or summarize the existing geologic and hydrologic conditions in the area generally or along proposed routes; thus it offers no basis for evaluating possible or actual impact thereon. Because of this lack of specific and organized information on the physical environment, there is little assurance that all impacts thereon have been identified. The descriptions of impacts involving spoil disposal, sediment control, hydrologic effects, and water quality are, in our view, wholly inadequate individually. Collectively, the section is inadequate in that it neglects impact on the groundwater regime and the geological related hazards associated with safety aspects of both deep-surface excavation and tunneling.

2. Air quality - The statement discusses air pollution on the basis that Metro will be beneficial to the environment, since traffic volumes will be lessened and vehicle exhausts now polluting the atmosphere will be thus reduced. This analogy will hold true regardless of the growth or density of development in the metropolitan area, since Metro can move more people than the highway system for the same manpower and capital investment. No

Mr. Convisser

measurement of this effect is included, although some estimates must be available. In addition, there is no analysis of air pollution resulting from generation of power for operation of the full Metro system.

3. There is a lack of detail in the statement concerning the condition of air discharged through the vents serving Metro lines and stations. The repeated discharging of large volumes of exhaust containing moisture or chemicals and which can alter natural temperature ranges will often result in a detrimental effect on trees and vegetation.

4. Spoils disposal - The problem of handling spoil disposal is discussed in considerable detail. However, the statement fails to mention the sometimes very important value of the existing conditions of the land where spoil will be deposited. It is stated that spoil can be used as fill to create land conditions suitable for development, but the statement does not describe, evaluate, or otherwise note that environmental losses will occur as a result of this reclamation. On balance, it may be determined that lands "improved" by the use of spoil material would be more beneficial to the community and the environment, but any land so used is being diverted from its current use and its environmental value is altered. This alteration is an important factor to be considered in the selection of sites for filling. For example, certain low land containing swamps and marsh found in flood plains can, in many instances, serve a better environmental purpose as an irreplaceable natural resource than it can as land reclaimed by filling. Additionally, caution must be exercised during the dumping of spoil materials.

5. Vegetation and wildlife - The environmental impact statement notes that considerable land now used as wildlife habitat, most of which is in private ownership, will be utilized for right-of-way, parking areas, and station sites, and that this use of existing natural resources will result in an irretrievable loss. The statement should also analyze the importance of these losses and consider what methods are available to compensate for them.

6. Socio-Economic and Cultural Impacts - In developing the proposal, WMATA has reflected the needs of the visitor to Washington, D.C. It reports the public will benefit by the increased accessibility of cultural and recreational opportunities. It is not apparent, however, that indepth consideration was given to making the recreational resources of the suburbs and fringes more available to the less economically fortunate and relatively immobile residents of the core metropolitan area. Such consideration is deserving of attention.

7. Impacts on Parkland, Historic and Archeological Sites - Metro will have significant impact on parklands at many locations and in several ways. For example, the alignment of the E route on the surface through Fort Totten is one specific item of major concern because of its impact on parkland. (It is listed on page 99 under Sherman Circle, but is significant enough that it should have its own subtitle). The E route would take approximately 9-1/5 acres of parkland for right-of-way, and the balance of the strip,

containing approximately 15 acres, would be rendered useless as parkland. We have very strong objections to this proposal and believe that this portion of E route should continue underground beyond the Maryland-D.C. line.

8. The reference on page 97 to the Halprin plan is no longer valid and should be deleted.

9. We hope that Metro planners will pursue very intensive consultation with the Advisory Council on Historic Preservation, in concert with other historic preservation groups. This will assure that every alternative is given full consideration in each case where some adverse effect upon cultural resources might be expected. In pursuance of our responsibilities under Executive Order 11593, we are prepared to render, through the National Park Service, a certain measure of advice and assistance to assure that cultural values are preserved where possible.

10. We believe that it should be recognized that the cultural resources susceptible to the methods of archeology are not limited to aboriginal remains. The statement does not seem to recognize that archeology can provide valuable information about the history and development of an urban area. To assure the best and most convenient measure of archeological caution during Metro construction, we suggest that a professional archeologist be engaged to observe and monitor all construction activity. Such a qualified individual would be best prepared to recognized archeological remains unearthed during construction and determine the proper course of action before work continues. In many sections of the construction project, it would be even more fruitful to have such an individual survey the routes before development.

11. We must take issue with the WMATA contract specifications for historical and scientific specimens quoted on page 82. Only qualified professional archeologists can recognize uncovered remains, assess their value, and determine a proper course of action. We do not believe that the project engineer is qualified to make such judgments. Accordingly, we suggest that either the specifications be revised or that WMATA's procedures in pursuance thereof be changed to assure that qualified persons are available if cultural and scientific materials are discovered during construction. The specifications also seem limited in their emphasis upon artifacts. It should be recognized that context is an important element in archeological investigation, and that an entire site, not merely its artifacts, is necessary to ensure complete study. Nonetheless, if the context is detroyed, artifacts may still have some scientific value and accordingly should be protected.

12. The National Park Service has negotiated a very detailed agreement (appendix B) governing requirements for the issuance of permits for the use of parklands on a temporary basis, for the replacement of park resources

Mr. Convisser

and facilities to be used on a permanent basis, and for the restoration of park resources and facilities disturbed or adversely affected as a result of any portion of the Metro system built on or adjacent to parkland. All details of the design for Metro facilities that will affect parkland are to be approved by the National Park Service.

Additionally, the Park Service approves all plans for restoration and/or reconstruction of parklands or facilities damaged as a result of Metro prior to the issuance of a permit for use of parkland. This cooperative agreement is quite comprehensive. It is hoped that local entities have similar prerogatives available to them to ensure that open space and recreational values are preserved and/or enhanced. Such agreements should adequately provide for meeting statutory requirements applicable to lands and facilities which have been acquired and/or developed through Federal assistance. The final environmental statement would be improved if these considerations were included.

Sincerely yours,

Assistant Secretary of the Interior

Mr. Martin Convisser
Director, Office of Environmental Affairs
Department of Transportation
Washington, D.C. 20590

RESPONSE TO COMMENTS OF THE U.S.
DEPARTMENT OF THE INTERIOR (keyed to pages and paragraphs in letter)

Facilities and Government Lands, and National Park Service, Bureau of Sport Fisheries and Wildlife, and Office of Environmental Review

1. <u>Geology and Hydrology</u> (page 1, paragraph 3)

Geologic and hydrologic considerations throughout the region as they relate to the Metro rapid transit system are discussed and presented in map form in the Geology and Watershed Study in Appendix C in Part III of the Report; a summary of the study findings is presented in the Natural and Ecological Impacts subsection of Section 2 of this study.

2. <u>Air Quality</u> (page 1, paragraph 4)

An analysis of the region-wide impact of the Metro system upon air quality is presented in Appendix H , the Air Quality Study prepared by the Metropolitan Washington Council of Governments.

3. <u>Condition of Air Discharged through Vents</u> (page 2, para. 2)

The condition of air discharged through the vents serving Metro lines and stations is discussed in Section 1 of this study as revised, under Metro system characteristics.

4. <u>Spoils Disposal</u> (page 2, paragraph 3)

Existing conditions of land where it is proposed to deposit spoils are discussed in the Geology and Watershed Study in Appendix C in Part III of the Report; a summary of the study's findings concerning spoils disposal is presented in the Natural and Ecological Impacts subsection of Section 2 of this study.

5. <u>Vegetation and Wildlife</u> (page 2, paragraph 4)

The locations of land now serving as wildlife habitat that will be utilized for rights-of-way, parking areas and station sites are identified in detail in Route Environmental Studies available from WMATA; Route Environmental Studies include consideration of alternative alignments to avoid such taking and of suitable replacement open space as well as detailed definition of the character of potential takings. Areas of wildlife habitat of five acres or more potentially affected by the Metro system are identified in Section 2 of Part II of this Report, the Critical Areas Study.

6. Socio-Economic and Cultural Impacts (page 2, paragraph 5)

Increased accessibility of cultural and recreational opportunities to residents of the District resulting from construction of Metro is discussed in the Socio-Economic and Cultural Impacts subsection of Section 2 of this study; particular major instances of such increased accessibility are noted in Section 2 of Part II of this Report, the Critical Areas Study.

7. Parkland Impact of "E" Route (page 2, paragraph 6)

The impacts of the "E" Route upon parkland are discussed briefly in Section 2 of Part I and are noted in Part II of this Study, Route Summaries and Critical Areas Identification; these impacts are discussed and evaluated at length in a separate Route Environmental Study available from WMATA for review.

8. Halprin Plan (page 3, paragraph 2)

The reference to the Halprin Plan has been deleted.

9. Historic Preservation (page 3, paragraph 3, 4 and 5)

WMATA's specifications and procedures for historical structures are further discussed in Section 2 of this revised report in the subsection concerning Impacts on Parkland, Historic and Archaeological Sites.

10. National Park Service Approval of Impingement upon Parkland (page 3, page 3 and 4, paragraphs 6, 1 and 2)

A description of this process has been incorporated in the subsection of Section 2 of this revised study concerning Impacts on Parkland, Historic and Archaeological Sites.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

May 16, 1973

Mr. Martin Convisser
Director
Office of Environmental Affairs
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

Re: Metro, Washington, D.C.

Dear Mr. Convisser:

This letter reviews the draft impact statement for Metro regarding the adequacy of its discussion of the system's impact on noise quality. Together with our letter of May 1, 1973, we have completed our review of the Metro draft statement.

We are concerned with the timing of the environmental review process: because right-of-way acquisition and construction are well underway, some opportunities for noise control may already be limited. We strongly suggest that the final statement be circulated prior to the next request for Federal funding. The following issues outline additional information which our Office of Noise Abatement and Control feel is necessary for a satisfactory final statement.

1. The acoustical consultant's report should be made available to EPA and to other agencies with noise expertise.

2. We find questionable the statement (page 27) that "(i)n some cases the above ground noises ... will be completely masked by existing noises...". Specific evidence should be cited. More importantly, though, we feel that excessive ambient noise conditions do not justify additional loud sources, especially as new vehicular, railroad, and aircraft noise standards are to be promulgated by EPA. Predicted noise levels should be shown, to assess the "masking effect".

3. It is possible that ground-borne noise and vibration will be the most serious noise problem associated with Metro (page 27). The final EIS should estimate the severity of this problem.

4. We question the applicability of Noise Curves to describe vibration impact. Vibration criteria, independent of NC curves, should be discussed in the final statement.

5. The definition of semi-residential areas is vague. From the zoning designation shown (page 29), it appears that residents in multiple-use areas will not experience the same noise quality as those in residential areas. The final EIS should provide the basis for this broad distinction.

6. Methods of monitoring and enforcing construction-generated noise should be described. Further, there should be a rather more detailed discussion of how these noises might affect construction workers; adherence to the Occupational Safety and Health Act should be evaluated. The Department of Labor (Occupational Health and Safety Administration) should review this portion of the statement.

7. Finally, the statement (page 30) that passby noise "is generally found to be acceptable if the peak level does not exceed 70 dBA" is questionable, as passby noise is dependent on human activity: 70 dBA represents, for example, a threshold for face-to-face communication.

We appreciate the time extension you have allowed us to complete this section of our review. Would you please send us six copies of the final impact statement to complete the NEPA review process?

Sincerely yours,

Robert J. Blanco

Robert J. Blanco, P.E.
Chief
Environmental Impact Branch